

AD-A103 461

HUMAN RESOURCES RESEARCH ORGANIZATION ALEXANDRIA VA  
MINE HOIST OPERATOR TRAINING PROGRAM, TEST QUESTIONS.(U)  
DEC 79

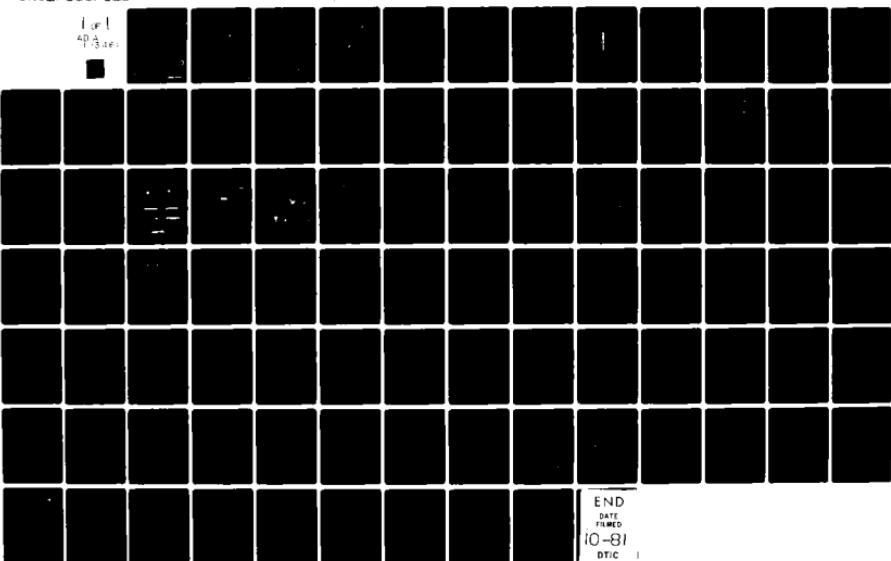
H0387003

F/6 5/9

UNCLASSIFIED

NL

1 of 1  
AD-A103 461



END  
DATE FILMED  
10-81  
DTIC

AD A103461

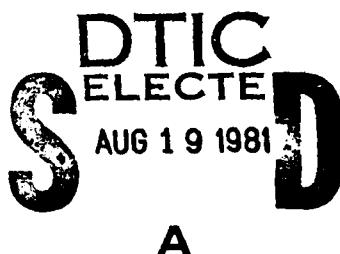
(6) Mine Hoist Operator  
Training Program,

Test Questions .

(11) Dec 2779

(15) H0387003

(12) 91



DTIC FILE COPY

This document has been approved  
for public release and sale; its  
distribution is unlimited.

405 260 gwt

81 8 19 037

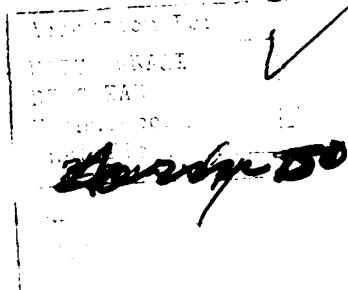
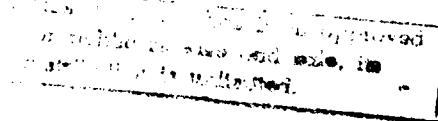
A103 4b  
A103 121

REPORT DOCUMENTATION PAGE		READ INSTRUC BEFORE COMPLET
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG N
		AD-A103 461
4. TITLE (and Subtitle)  MINE HOIST OPERATION TRAINING PROGRAM (with Test Questions and <del>Test Answers</del> )		5. TYPE OF REPORT & PERIOD
		6. PERFORMING ORG. REPORT N
7. AUTHOR(s)		8. CONTRACT OR GRANT NUMBER  H0387003
9. PERFORMING ORGANIZATION NAME AND ADDRESS  Human Resources Research Organization (HumRRO) 300 N. Washington Street Alexandria, Virginia 22314		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS  U. S. Bureau of Mines 4800 Forbes Avenue Pittsburgh, PA 15213		12. REPORT DATE  December 1979
		13. NUMBER OF PAGES  [REDACTED]
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report)  unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report)  Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES  *includes pages in Test Questions and Test Answers Booklet.  Research performed under HumRRO Project		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)  Mine Hoist Operator Training Program		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)  The purpose of this program is to train and re-train mine hoist operators. The training is in three parts. Part I the student will learn the basic components and operations of a mine hoist; in Part II the student will learn the specific components of the hoist they are being trained to operate; and Part III the student will become skilled in operating their assigned hoist. This is the  Test Question Booklet and <del>Test Answers</del> Booklet are separate		

*Source 111-100*  
*111-100*  
*P-11*  
*BBW*

## CONTENTS FOR TEST QUESTIONS

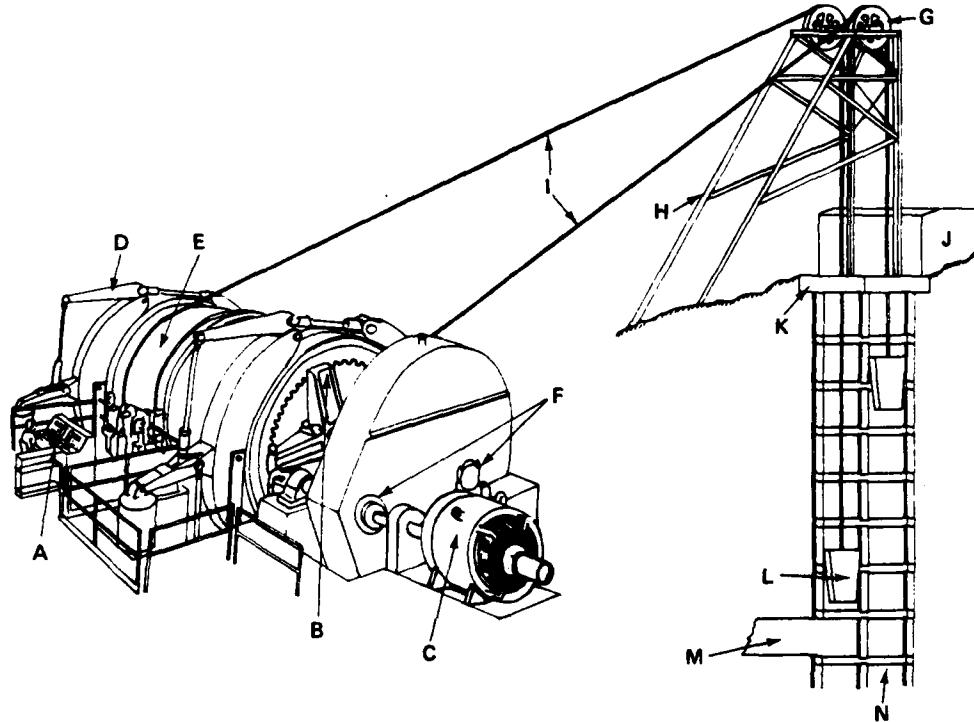
	Page
Mine Hoist .....	T-1-1
Hydraulic System .....	T-2-1
Shaft .....	T-3-1
Conveyances .....	T-4-1
Headframe .....	T-5-1
Sheaves .....	T-6-1
Brake System .....	T-7-1
Clutch .....	T-8-1
Hoist Drum or Wheel Assembly .....	T-9-1
Wire Rope .....	T-10-1
Electrical System (General) .....	T-11-1
Depth Indicator .....	T-12-1
Safety Controller .....	T-13-1
Hoist Control Panel .....	T-14-1
Communication Systems .....	T-15-1
Lubrication .....	T-16-1
Inspection .....	T-17-1
Maintenance .....	T-18-1
Safety Features .....	T-19-1
Electrical System (Fundamental) .....	T-20-1
Beginning of Shift Activities .....	T-21-1
Routine Shift Activities .....	T-22-1
Emergency Procedures .....	T-23-1
End of Shift Activities .....	T-24-1
Federal Regulations .....	T-25-1



## TEST QUESTIONS FOR THE MINE HOIST

Complete this sentence with the correct answer:

1. The mine hoist is used to \_\_\_\_\_
- 



Above is a picture of a mine hoist. In Column I write the name of each lettered part. In Column II write the number of the sentence from the list on page T-1-2 that explains each part.

I. Name of Part

2. A \_\_\_\_\_  
3. B \_\_\_\_\_  
4. C \_\_\_\_\_  
5. D \_\_\_\_\_  
6. E \_\_\_\_\_  
7. F \_\_\_\_\_

II. Explanation of Each Part

- 9 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

	<u>I. Name of Part</u>	<u>II. Explanation of Each Part</u>
8.	G _____	_____
9.	H _____	_____
10.	I _____	_____
11.	J _____	_____
12.	K _____	_____
13.	L _____	_____
14.	M _____	_____
15.	N _____	_____

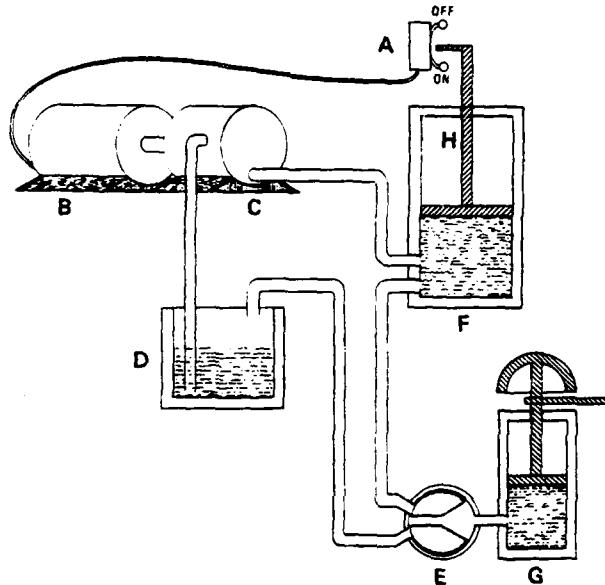
Answers for Column II

1. The area where ore and waste are deposited.
2. The path from the surface to the underground workings.
3. The motor which turns the hoist drum or wheel.
4. The device which engages or disengages the drum from the hoist motor.
5. Gears which connect the hoist motor to the hoist drum or the hoist wheel.
6. The drum or wheel which raises and lowers the hoist rope.
7. The wire cable which raises and lowers the conveyance.
8. The mine level from which ore or waste is being hoisted.
9. The station from which the hoist is operated.
10. The device which slows, stops and holds the hoist rope.
11. The grooved wheel which supports the rope.
12. The structure which holds the head sheave.
13. The area surrounding the surface opening of the shaft.
14. The platform on which men, materials, ore and waste are hoisted/lowered.

## TEST QUESTIONS FOR THE HYDRAULIC SYSTEM

Complete this sentence with the correct answer:

1. A hydraulic system enables the hoist operator to \_\_\_\_\_
- 



Above is a picture of a hydraulic system. In Column I write the name of each lettered part. In Column II write the number of the sentence from the list on page T-2-2 that explains each part.

	I. Name of Part	II. Explanation of Each Part
2. A	<u>Drive Motor Control</u>	_____
3. B	_____	_____
4. C	_____	_____
5. D	_____	_____
6. E	_____	_____
7. F	_____	_____
8. G	_____	_____
9. H	_____	_____

### Answers for Column II

1. An operating control which the operator uses to control the flow of oil in the system.
2. A sump that stores oil at low pressure.
3. A control that will start and stop the drive motor.
4. An operating mechanism, usually a cylinder and piston, that does the work.
5. An accumulator that will store oil at high pressure.
6. A pump that will pressurize oil.
7. An electric motor that operates pump.
8. A piston whose movement controls the drive motor control.

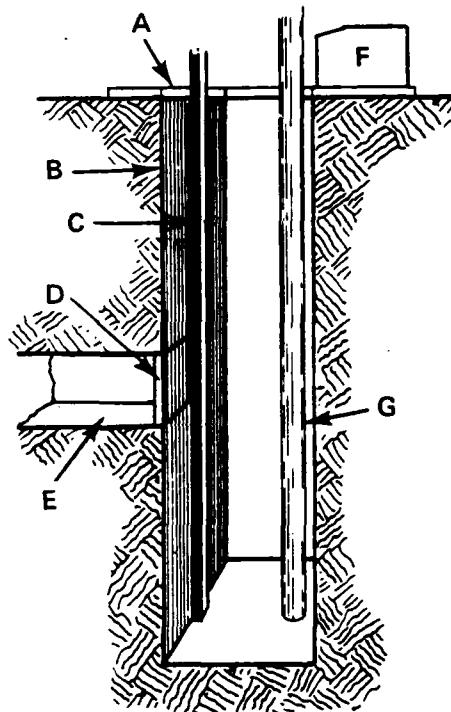
Complete these sentences with the correct answers:

10. Oil flows from the operating control into the sump or the \_\_\_\_\_.
11. The piston moves upward and may, for example, engage the \_\_\_\_\_.
12. When the operator wants to disengage the clutch, he/she uses the control to allow oil to flow from the operating mechanism to the \_\_\_\_\_.
13. The piston will move \_\_\_\_\_.
14. As oil flows out of the accumulator, the accumulator piston moves \_\_\_\_\_.
15. This movement causes the drive motor control to start the \_\_\_\_\_.
16. The motor operates the pump which pumps oil from the sump to the \_\_\_\_\_.
17. This increase in oil raises the \_\_\_\_\_.
18. When sufficient oil has been pumped, the upward movement of the accumulator piston \_\_\_\_\_.

## TEST QUESTIONS FOR SHAFT

Fill in the blank with the letter of the answer that best completes the sentence.

1. The shaft in a mine provides a path for \_\_\_\_\_.
  - a. one or more conveyances
  - b. power cables
  - c. communication and other control links
  - d. all of the above
  - e. none of the above



Above is a picture of a shaft. In Column I write the name of each lettered part. In Column II write the number of the sentence from the list on page T-3-2 that explains each part.

	I. Name of Part	II. Explanation of Each Part
2. A	Collar	4
3. B		
4. C		
5. D		
6. E		
7. F		
8. G		

### Answers for Column II

1. The sides of the shaft; made of timber, steel or cement.
2. The area where the conveyance empties its load of coal or ore.
3. The opening of a level onto the shaft.
4. The area surrounding the shaft opening at the face of the mine.
5. They keep the conveyance in proper position. Vertical shafts have fixed guides made of wood timbers or steel rails or rope guides of locked coil ropes. Slope shafts have tracks to guide the conveyance and rollers to guide the rope.
6. The guard across a landing/station of the shaft.
7. The paths into the mine for power, water, air, and communications.

Fill in the blank with the letter of the answer that best completes the sentence. Read all of the choices before selecting your answer.

#### Metal and Nonmetallic

9. Shaft landings shall be equipped with \_\_\_\_\_.
  - a. substantial safety gates
  - b. substantial dump areas
  - c. a rope to stretch across the opening
  - d. all of the above
  - e. none of the above
10. All tracks leading to a shaft collar or landing shall have \_\_\_\_\_.
  - a. a stop sign
  - b. positive stopblocks
  - c. derail switch
  - d. b and c
  - e. none of the above
11. Suitable clearance at shaft stations shall be provided to allow safe movement of \_\_\_\_\_.
  - a. persons
  - b. equipment
  - c. materials
  - d. a, b and c
  - e. none of the above
12. A safe means of passage around open shaft compartments shall be provided on landings with more than one \_\_\_\_\_.
  - a. utility cable
  - b. shaft guide
  - c. entrance to the shaft
  - d. a and c
  - e. none of the above

13. Safety gates shall be \_\_\_\_\_ except when loading or unloading shaft conveyances.
- a. closed
  - b. open
  - c. locked
  - d. lubricated
  - e. none of the above
14. Shaft sets shall be \_\_\_\_\_ .
- a. kept in good repair
  - b. kept clean of hazardous material
  - c. oiled daily
  - d. a and b
  - e. none of the above
15. Shafts that have not been inspected within the past \_\_\_\_\_ shall not be used until an inspection has been conducted by a competent person.
- a. day
  - b. 7 days
  - c. month
  - d. year
  - e. none of the above
16. When men are working in a shaft, \_\_\_\_\_ .
- a. "Men Working Shaft" sign shall be posted at hoist
  - b. "Men Working Shaft" signs shall be posted at controls
  - c. the hoistman will be informed
  - d. all of the above
  - e. none of the above
17. Rollers used in operating inclined shafts shall be \_\_\_\_\_ .
- a. kept in good repair
  - b. lubricated
  - c. properly aligned
  - d. all of the above
  - e. none of the above

#### Coal Mines

18. The shaft lining and parts shall be examined \_\_\_\_\_ .
- a. hourly
  - b. daily
  - c. weekly
  - d. monthly
  - e. yearly
19. Safety gates shall be \_\_\_\_\_ .
- a. self-closing
  - b. located at all open entrances to shafts at the top
  - c. located at all open entrances to shafts at each landing
  - d. kept closed except when the cage is at the landing
  - e. all of the above

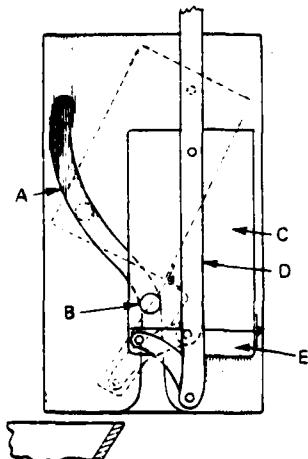
## TEST QUESTIONS FOR CONVEYANCES

Fill in the blank with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

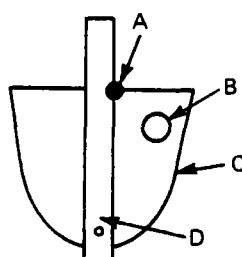
1. A skip is used mainly to carry \_\_\_\_\_.
  - a. men
  - b. ore and waste
  - c. some heavy equipment
  - d. a and c
  - e. b and c
  
2. A cage is used mainly to carry \_\_\_\_\_.
  - a. men
  - b. ore and waste
  - c. equipment
  - d. a and c
  - e. a and b
  
3. A car can be used to carry \_\_\_\_\_.
  - a. men, equipment if it has seats
  - b. ore and waste if it has no seats
  - c. heavy equipment if it has no seats
  - d. all of the above
  - e. none of the above
  
4. Fill in the blank above each illustration with the correct kind of conveyance: cage, skip or car. Write the name of each of the lettered parts.

I. \_\_\_\_\_

II. \_\_\_\_\_

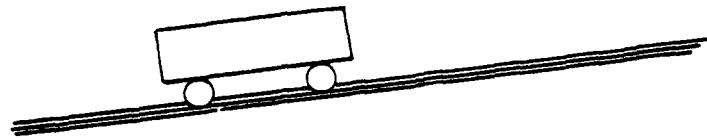


- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_
- D. \_\_\_\_\_
- E. \_\_\_\_\_



- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_
- D. \_\_\_\_\_

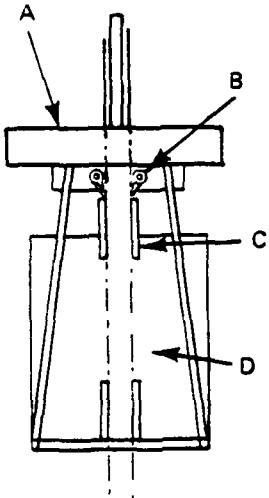
5. Label the illustration cage, skip or car: \_\_\_\_\_.



6. Fill in the blank above the illustration with the correct kind of conveyance: cage, skip or car.

Write the name of each lettered part:

I. \_\_\_\_\_



A. \_\_\_\_\_

B. \_\_\_\_\_

C. \_\_\_\_\_

D. \_\_\_\_\_

Fill in the blank with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

7. A skip dumps its contents by \_\_\_\_\_.

- a. turning upside down
- b. opening its bottom or lower side
- c. rolling sideways and activating vacuums in the dump area
- d. a and b
- e. none of the above

8. The framework that supports the skip is the \_\_\_\_\_.

- a. dump roller
- b. bail
- c. gate or door
- d. track or scroll
- e. none of the above

9. The shape of the \_\_\_\_\_ causes the \_\_\_\_\_ to move horizontally and turn the skip upside down or open the skip dump gate.
- bonnet
  - track or scroll
  - guide shoe
  - dump roller
  - tail rope
10. The \_\_\_\_\_ travels along the shaft guide and prevents the conveyance from moving horizontally in the shaft.
- bonnet
  - man compartment
  - guide shoe
  - safety dog
  - gate or door
11. The emergency braking device attached to the conveyance is the \_\_\_\_\_.
- bonnet
  - man compartment
  - guide shoe
  - safety dog
  - gate or door
12. The protective enclosure of a cage that people ride in is the \_\_\_\_\_.
- bonnet
  - man compartment
  - guide shoe
  - safety dog
  - gate or door
13. The \_\_\_\_\_ protects the man compartment from falling objects.
- bonnet
  - man compartment
  - guide shoe
  - safety dog
  - gate or door
14. The safety dog of a cage is activated by a spring if \_\_\_\_\_.
- the bonnet is removed
  - slack appears in the hoist rope
  - fraying appears in the hoist rope
  - the guide shoes are lubricated
  - none of the above

15. A vertical shaft hoist may have \_\_\_\_\_.
- two ropes with two conveyances
  - a single rope and a single conveyance
  - two ropes with a conveyance and a counterweight
  - all of the above
  - none of the above
16. A \_\_\_\_\_ may be connected to the bottom of the conveyances to balance the weight of the hoist rope.
- latch
  - tailrope
  - toggle link
  - bonnet
  - b and d

#### FEDERAL REGULATIONS

##### Metal and Nonmetallic Mines

17. Man cages and skips used for transporting people in any vertical shaft or any slope shaft with a 45° inclination angle shall be covered with a \_\_\_\_\_.
- bonnet
  - bar
  - guide shoe
  - tailrope
  - b and c
18. Buckets shall not be used to hoist men except during \_\_\_\_\_.
- shaft sinking operations, and inspection
  - maintenance, and repairs
  - the beginning of the shift
  - the end of the shift
  - a and b

##### Coal Mines

19. Cages used for hoisting men shall be constructed with \_\_\_\_\_.
- sides enclosed to a height of at least six feet
  - gates, safety chains or bars across the ends of the cage when people are being hoisted or lowered
  - tailropes to balance the weight of the hoist rope
  - a and b
  - none of the above

20. Self-dumping cages, platforms or other devices used for transportation of men shall have a \_\_\_\_\_ when men are transported in them.
- a. toggle link to allow braking
  - b. bail to prevent turning
  - c. locking device to prevent tilting
  - d. a and c
  - e. none of the above

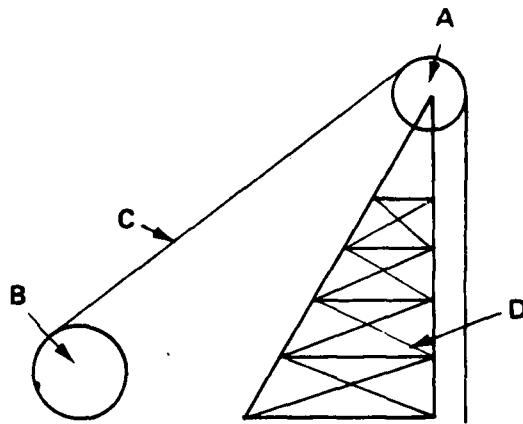
## TEST QUESTIONS FOR HEADFRAME

Complete this sentence with the correct answer:

1. The headframe in a mine is used to \_\_\_\_\_

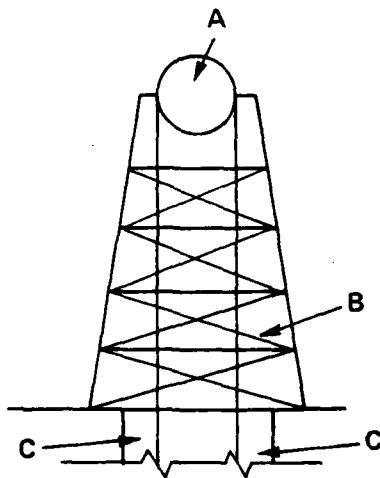
2. Write the name of each lettered mine part:

- A. \_\_\_\_\_  
B. \_\_\_\_\_  
C. \_\_\_\_\_  
D. \_\_\_\_\_

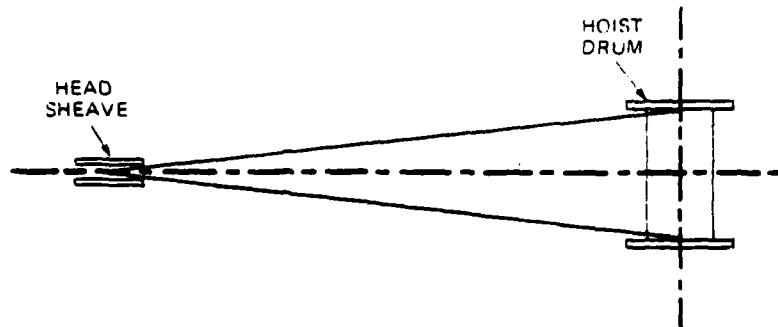


3. Write the name of each lettered mine part:

- A. \_\_\_\_\_  
B. \_\_\_\_\_  
C. \_\_\_\_\_



4. Draw an arrow to indicate the fleet angle.



Fill in the blank with the letter of the answer that best completes each sentence.  
Read all of the choices before selecting your answer.

5. Too great a fleet angle will result in excessive wear on the \_\_\_\_\_.
- shaft
  - drum
  - rope
  - conveyance
6. Federal regulations state that fleet angles on hoists installed after November 15, 1979 shall \_\_\_\_\_.  
a. not be greater than 1 degree for smooth drums or greater than 1/2 degree for grooved drums  
b. not be less than 1 1/2 degrees for smooth drums or less than 2 degrees for grooved drums  
c. not be greater than 1 1/2 degrees for smooth drums or greater than 2 degrees for grooved drums  
d. none of the above

## TEST QUESTIONS FOR SHEAVES

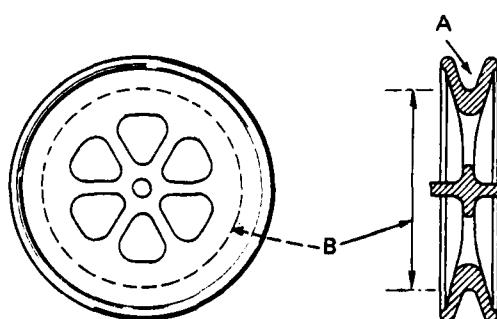
Complete this sentence with the correct answer:

1. A sheave is a grooved wheel which supports the hoist \_\_\_\_\_.

2. Label the lettered sheave features below:

A. \_\_\_\_\_

B. \_\_\_\_\_

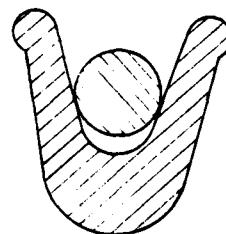


Fill in the blank with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

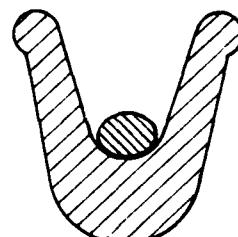
3. \_\_\_\_\_ sheaves support the rope and the conveyance at the head of the shaft; \_\_\_\_\_ sheaves support the rope as it changes direction; \_\_\_\_\_ sheaves support a long length of rope.

- a. groove
- b. head
- c. diameter
- d. knuckle or curve
- e. idler

4. In the Figure to the right the groove is too small and \_\_\_\_\_.  
a. The rope will be squeezed and distorted  
b. The rope will be damaged  
c. The groove will be damaged  
d. all of the above  
e. none of the above



5. In the Figure to the right the groove is too large and \_\_\_\_\_.  
a. The rope will be squeezed and distorted  
b. The rope will be flattened  
c. The rope will weaken  
d. b and c  
e. a and c



6. Too small a sheave diameter can cause the \_\_\_\_\_.
  - a. rope to be over-lubricated
  - b. rope to be squeezed and distorted
  - c. rope to bend sharply and possibly break wires
  - d. hoist to be overloaded
  - e. none of the above

## FEDERAL REGULATIONS

### Metal and Nonmetallic

7. Head, idler, knuckle and curve sheaves shall have \_\_\_\_\_ of proper contour for the specific rope diameter used.
  - a. bearings
  - b. grooves
  - c. conveyances
  - d. all of the above
  - e. none of the above
8. Sheaves shall be inspected \_\_\_\_\_ and kept properly lubricated.
  - a. hourly
  - b. daily
  - c. weekly
  - d. monthly
  - e. yearly

### Coal Mines

9. An examination of head sheaves for broken flanges, defective bearings, rope alignment, and proper lubrication shall be made \_\_\_\_\_.
  - a. hourly
  - b. daily
  - c. weekly
  - d. monthly
  - e. yearly

## TEST QUESTIONS FOR BRAKE SYSTEM

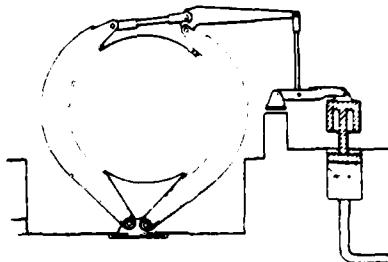
Complete this sentence with the correct answer:

1. The \_\_\_\_\_ of a mine hoist stop the hoist drum and hold it in one position.  
Below is a disc brake. Using the illustration as a guide, answer question 2 by filling in the blanks with the letters of the answers that best complete the sentence.



2. When the brake is applied, the \_\_\_\_\_ come together to press against the \_\_\_\_\_.
  - a. ring
  - b. weights
  - c. pads
  - d. disc
  - e. shoe

Below is a ring brake. Using this illustration as a guide, answer questions 3, 4 and 5 by filling in the blanks with the letters of the answers that best complete each sentence.



3. When the hydraulic pressure is released, the \_\_\_\_\_ pulls down on the brake lever, which pulls on the \_\_\_\_\_.
  - a. drawbar
  - b. weight
  - c. ring
  - d. disc
  - e. pads

4. When the brake shoe holders or bands are brought together, the brake shoes or bands press against the \_\_\_\_\_.
  - a. drawbar
  - b. weight
  - c. ring
  - d. disc
  - e. pads
  
5. The two types of ring brakes are \_\_\_\_\_.
  - a. jaw
  - b. disc
  - c. parallel motion
  - d. a and c
  - e. b and c

Fill in the blank with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

## FEDERAL REGULATIONS

### Metal and Nonmetallic Mines

6. Any hoist used to hoist men shall be equipped with a brake or brakes capable of holding its fully loaded \_\_\_\_\_ at any point in the shaft.
  - a. cage
  - b. skip
  - c. bucket
  - d. all of the above
  - e. none of the above
  
7. The operating mechanism of the clutch of every man-hoist drum shall be provided with a lock mechanism, or interlocked electrically or mechanically with the brake to prevent \_\_\_\_\_.
  - a. accidental withdrawal of the clutch
  - b. accidental withdrawal of the drum shaft
  - c. accidental overloading of the hoist motor
  - d. a and c
  - e. none of the above

8. Automatic hoists shall be provided with devices that automatically apply the \_\_\_\_\_ in the event of power failure.

**Coal Mines**

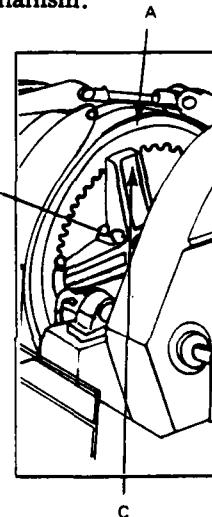
9. Brakes on hoists used to transport persons shall be capable of stopping and holding the fully loaded \_\_\_\_\_ at any point in the shaft, slope or incline.

- a. platform
- b. cage or other device
- c. lighting system
- d. a and b
- e. none of the above

## TEST QUESTIONS FOR CLUTCH

1. The purpose of the clutch is to \_\_\_\_\_.
  - a. stop the conveyance at the dump when unloading
  - b. show the position of the conveyance in the shaft
  - c. engage or disengage the drum from the hoist motor
  - d. indicate the condition of the hoist motor
  - e. b and c
  
2. Below is an illustration of a tooth or positive engagement clutch. Label each lettered part: clutch spider, clutch ring or operating mechanism.

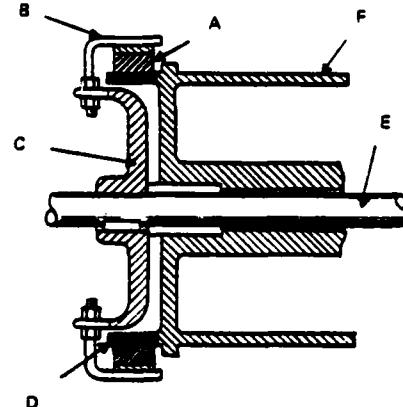
A. \_\_\_\_\_  
B. \_\_\_\_\_  
C. \_\_\_\_\_



3. When the clutch spider of a positive engagement clutch is against the clutch ring, the \_\_\_\_\_ engage with the \_\_\_\_\_ and the rotation of the drum shaft causes the clutch spider and the \_\_\_\_\_ to rotate.
  - a. drum
  - b. teeth of the ring
  - c. operating mechanism
  - d. friction blocks
  - e. teeth of the spider

4. Below is an illustration of a friction or band clutch. Label each lettered part: drum, shaft, band, spider, friction block or clutch ring.

- A. \_\_\_\_\_  
B. \_\_\_\_\_  
C. \_\_\_\_\_  
D. \_\_\_\_\_  
E. \_\_\_\_\_  
F. \_\_\_\_\_



5. When a friction clutch is engaged, the \_\_\_\_\_ press against the \_\_\_\_\_ ; this friction causes the ring and the attached \_\_\_\_\_ to rotate with the shaft.
- a. drum
  - b. clutch ring
  - c. operating mechanism
  - d. friction blocks
  - e. shaft

#### FEDERAL REGULATIONS

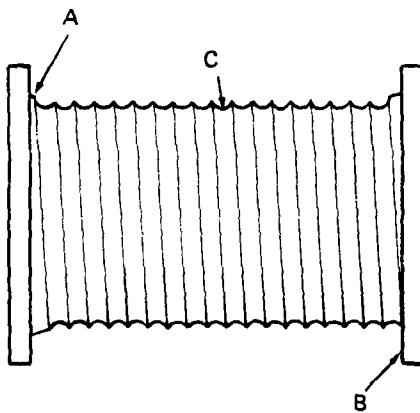
6. The operating mechanism of the clutch of every man hoist drum shall be \_\_\_\_\_ to prevent accidental withdrawal of the clutch.
- a. provided with a locking mechanism
  - b. interlocked electrically or mechanically with the brake
  - c. lubricated
  - d. welded to the conveyance
  - e. a and b

## TEST QUESTIONS FOR HOIST DRUM OR WHEEL ASSEMBLY

Complete this sentence with the correct answer:

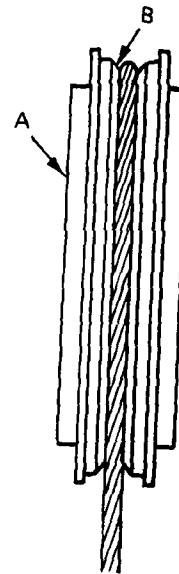
1. The hoist assembly lowers and raises \_\_\_\_\_.
2. Write the name of each lettered part.

A. \_\_\_\_\_  
B. \_\_\_\_\_  
C. \_\_\_\_\_



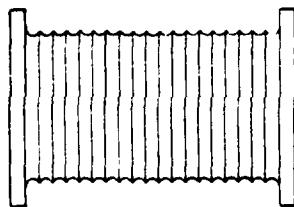
3. Write the name of each lettered part.

A. \_\_\_\_\_  
B. \_\_\_\_\_

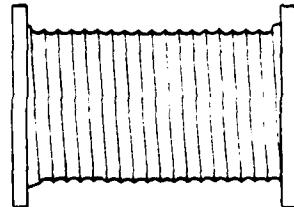


Fill in the blank with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

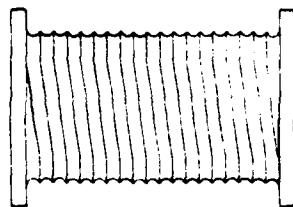
4. Channels in the surface of the drum are called \_\_\_\_\_.
  - a. flanges
  - b. grooves
  - c. risers
  - d. none of the above
  
5. Rims around the ends of the drum which keep the rope from slipping off are called \_\_\_\_\_.
  - a. risers
  - b. flanges
  - c. grooves
  - d. none of the above
  
6. Metal strips at the ends of the drum that raise each successive rope layer as it winds are \_\_\_\_\_.
  - a. flanges
  - b. grooves
  - c. liners
  - d. risers
  - e. none of the above
  
7. The \_\_\_\_\_ of head (Koepe) wheel provides a groove for the hoist rope.
  - a. flange
  - b. LeBus
  - c. liner
  - d. riser
  - e. none of the above
  
8. Label each type of grooving helical, parallel or LeBus.



A. \_\_\_\_\_

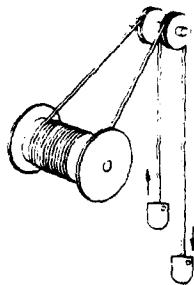


B. \_\_\_\_\_

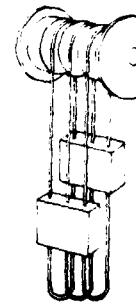


C. \_\_\_\_\_

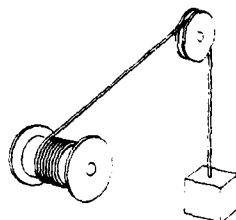
9. Label each type of hoist assembly single drum, one conveyance; double drum; single drum, two conveyance or head (Koepe) wheel.



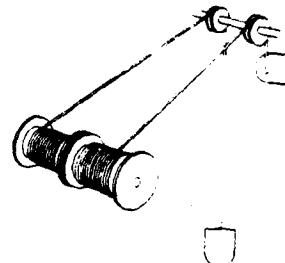
A. \_\_\_\_\_



B. \_\_\_\_\_



C. \_\_\_\_\_



D. \_\_\_\_\_

#### Metal and Nonmetallic Mines

10. Flanges on drums shall extend radially a minimum of \_\_\_\_\_ beyond the last wrap, whichever is the lesser.
- 4 inches or 3 rope diameters
  - 2 feet or 3 rope diameters
  - 4 feet or 1 rope diameter
  - 1 inch or 3 rope diameter
  - none of the above
11. Where grooved drums are used, the grooves shall be of suitable size and pitch for the \_\_\_\_\_ used.
- flanges
  - rope
  - conveyance
  - riser
  - none of the above

## TEST QUESTIONS FOR WIRE ROPE

Fill in the blank with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

1. Wire rope is used for \_\_\_\_\_.
  - a. guy wires
  - b. hoist rope
  - c. shaft guides
  - d. a, b, c
  - e. none of the above
  
2. Flexible wire rope is \_\_\_\_\_.
  - a. made up of many wires of small diameter
  - b. used for rope that bends frequently in use
  - c. made up of few wires of large diameter
  - d. used for rope that doesn't bend in use
  - e. a and b
  
3. Wire rope that doesn't bend in use \_\_\_\_\_.
  - a. is made of many wires of small diameter
  - b. has greater flexibility
  - c. is made up of few wires of large diameter
  - d. can be used for shaft guides
  - e. c and d

Match the letter in the right column to the correct definition in the left column.

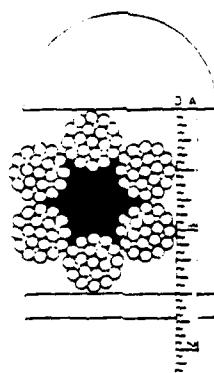
- |           |  |                |
|-----------|--|----------------|
| 4. _____  | lay that's twisted to the left   | A. lay         |
| 5. _____  | length of rope it takes for one strand to make a complete turn around core | B. right lay   |
| 6. _____  | lay that's twisted to the right  | C. lang lay    |
| 7. _____  | forms the center of the rope   | D. seizing     |
| 8. _____  | lay with strands twisted in one direction, wires twisted in the other      | E. left lay    |
| 9. _____  | lay with strands and wires twisted in the same direction                   | F. regular lay |
| 10. _____ | outer wires of the rope that bear against the sheave or drum               | G. core        |
|           |  | H. crown wires |

11. Explain what this designation means:

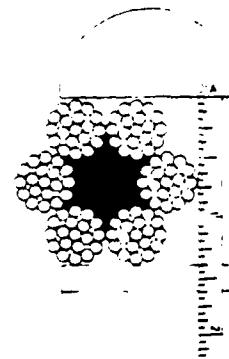
2 x 6

\_\_\_\_\_

12. Put a check beneath the correct method of measuring rope diameter:



A. \_\_\_\_\_



B. \_\_\_\_\_

13. Label each illustration right lay or left lay



A. \_\_\_\_\_



B. \_\_\_\_\_

14. Label each illustration regular lay or lang lay.

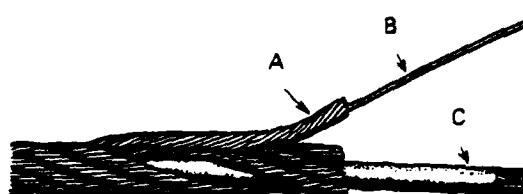


A. \_\_\_\_\_



B. \_\_\_\_\_

15. Below is an illustration of a wire rope. Write the wire rope part for each letter.

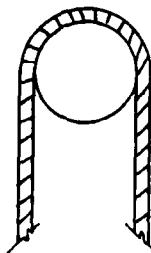


A. \_\_\_\_\_

B. \_\_\_\_\_

C. \_\_\_\_\_

16. The life of the rope can be prolonged by avoiding:



A. \_\_\_\_\_



B. \_\_\_\_\_



C. \_\_\_\_\_

17. Wire rope shape and structure are usually preserved in cutting and attaching by \_\_\_\_\_.  
\_\_\_\_\_.

- a. regular lays
- b. seizing
- c. lang lays
- d. peeling the core
- e. none of the above



18. The wire rope can be attached to a drum, conveyance or other object by putting a/an \_\_\_\_\_ into the \_\_\_\_\_ of the rope and placing a/an \_\_\_\_\_ into the eye for support.

- a. end
- b. middle
- c. core
- d. thimble
- e. eye

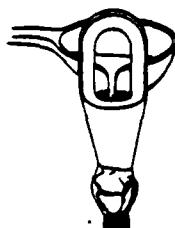
19. The eye can be formed in a rope with a/an \_\_\_\_\_ .

- a. U-clip
- b. socket
- c. wedge socket
- d. eye splice
- e. all of the above

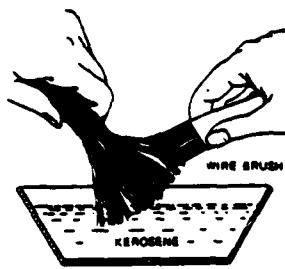
20. The short end of the eye of the rope is the \_\_\_\_\_ or \_\_\_\_\_ end; the long end is the \_\_\_\_\_ or \_\_\_\_\_ end.
- a. live
  - b. dead
  - c. bitter
  - d. working
  - e. core

21. Below are illustrations of an eye being formed with a socket. Write the letters in the order the steps are performed.

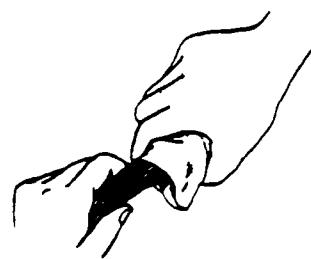
A



B



E



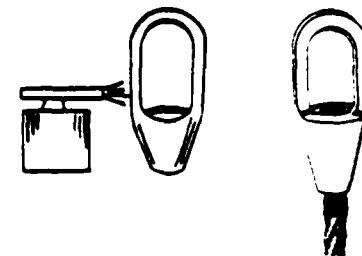
C



D

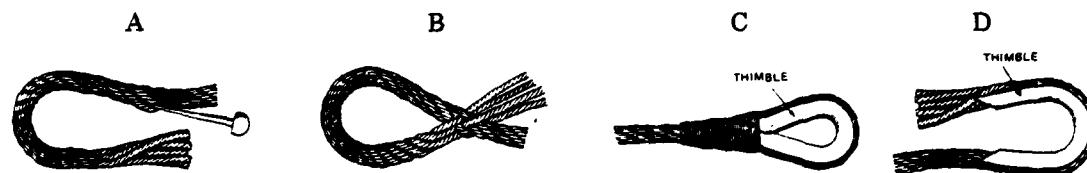


E



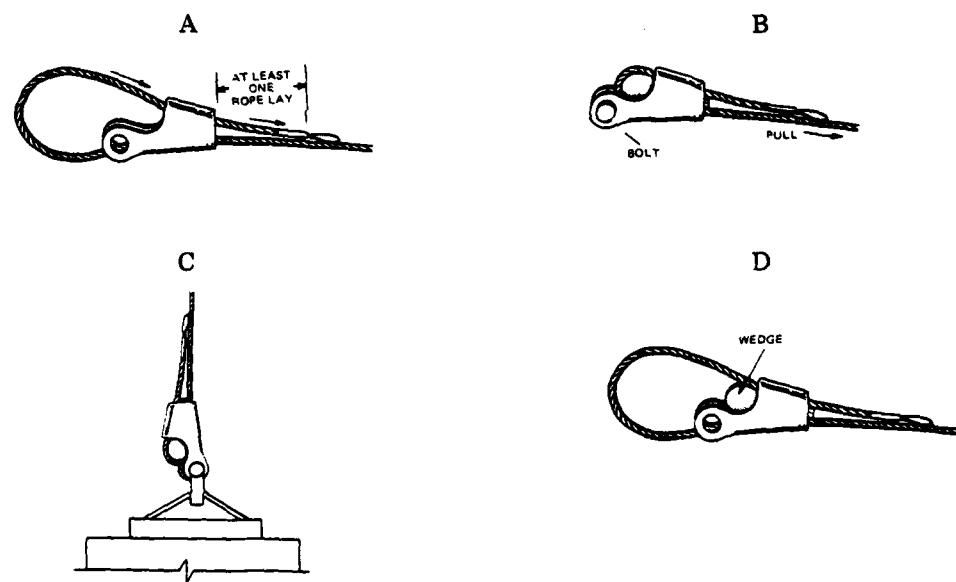
1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

22. Below are illustrations of an eye being formed with a splice. Write the letters in the order the steps are performed.



1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

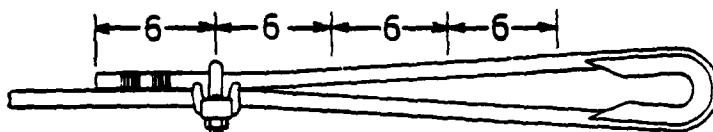
23. Below are illustrations of an eye being formed with a wedge socket. Write the letters in the order the steps are performed.



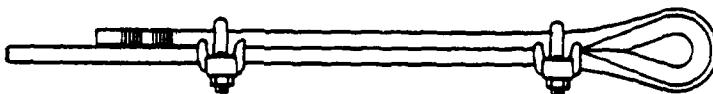
1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

24. Below are illustrations of an eye being formed with a U-clip. Write the letters in the order the steps are performed.

A



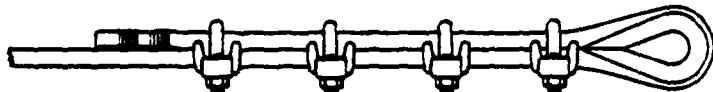
B



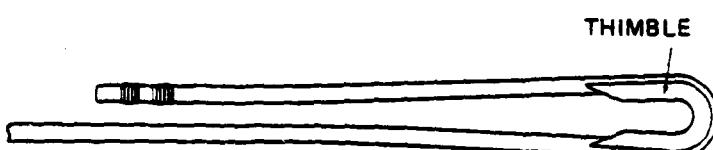
C

CALCULATE THE NUMBER OF CLIPS  
AND THE CLIP SPACING

D



E



1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

25. A wire rope should be removed from the hoist if \_\_\_\_ .
- a. there are more than 6 broken wires in 1 lay
  - b. corrosion or distortion occurs
  - c. crown wire diameter is less than 65% of the original
  - d. the diameter is reduced
  - e. all of the above
26. The wire rope can be lubricated by \_\_\_\_ .
- a. bathing
  - b. pouring
  - c. painting
  - d. swabbing
  - e. all of the above
27. A rope with a 300,000 pound breaking strength carrying a normal load of 30,000 pounds has a safety factor of \_\_\_\_ .

**TEST QUESTIONS FOR  
ELECTRICAL SYSTEM (General)**

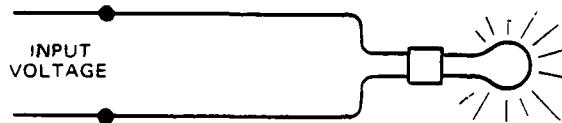
1. Voltage causes \_\_\_\_\_ to flow through an electrical circuit.

2. If we increase the input voltage in the circuit below, the current flow will

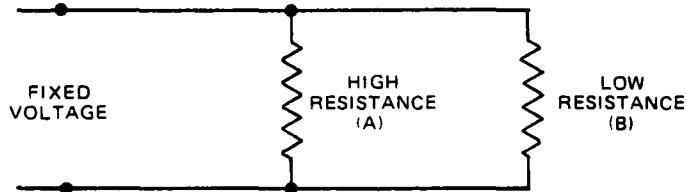
increase       decrease

and the light will burn

brighter       dimmer

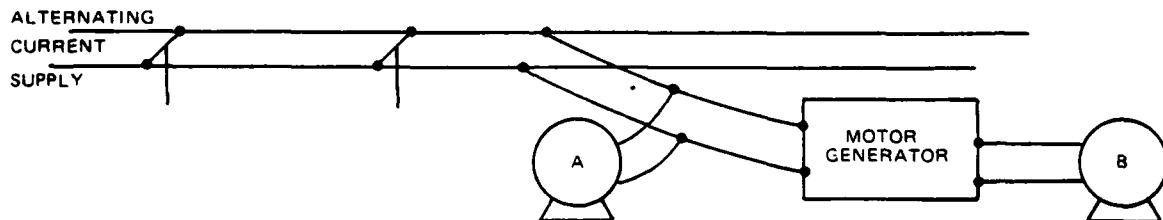


3. Will more current flow through A or B? \_\_\_\_\_

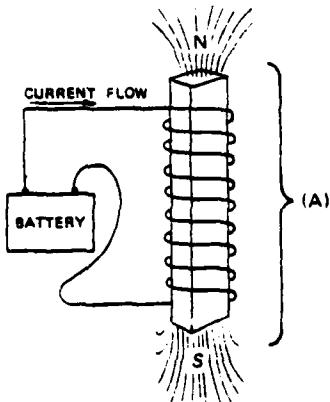


4. One of the motors is an alternating current, the other is a direct current motor.

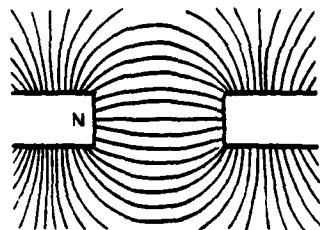
Identify them.    A. \_\_\_\_\_    B. \_\_\_\_\_



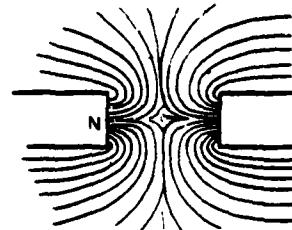
5. What kind of a magnet is (A)? \_\_\_\_\_ If we reverse the current flow, will the N pole be at the Top \_\_\_\_\_ or Bottom \_\_\_\_\_.



6. These poles attract each other. The one on the right is a \_\_\_\_\_ Pole.



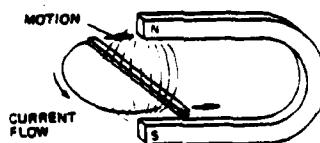
These poles repel each other. The one on the right is a \_\_\_\_\_ Pole.



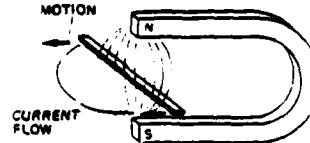
7. In the first figure the motion of the conductor is from left to right and current flows as shown by the arrow.

In the second figure the motion of the conductor is from right to left. Show by an arrow which way the current will flow.

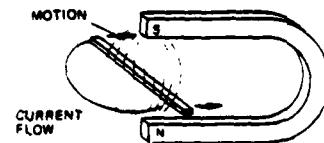
In the third figure the motion of the conductor is the same as in the 1st figure but the position of the poles is reversed. Indicate the direction of current flow.



(1)

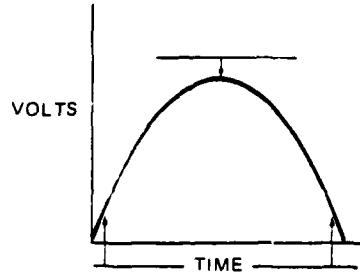


(2)

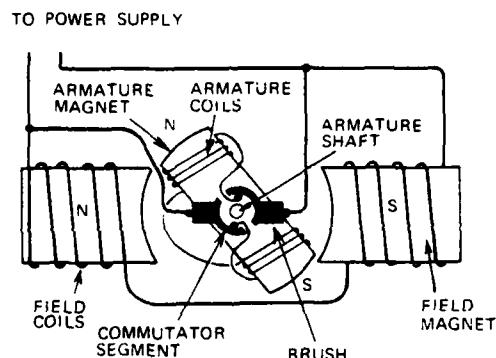


(3)

8. This is a diagram of the voltage generated in a wire as it passes through a magnetic field. Indicate (with an arrow) where it enters the field, where it is in the center of the field, and where it is leaving the field.



9. Indicate with an arrow which way the armature of this motor will turn.



10. Each column describes a generator.

Strong Field  
Fast Rotation  
           Output

Slow Rotation  
Weak Field  
           Output

11. Fill in the following for an alternating current motor.

Slip	Armature Current Flow	Power Output
High	<u>          </u>	<u>          </u>
Medium	<u>          </u>	<u>          </u>
Low	<u>          </u>	<u>          </u>

12. Your AC hoist motor is starting to hoist a heavy load. The armature switches are  
Open \_\_\_\_\_ Closed \_\_\_\_\_. (Check one)

13. When a direct current hoist motor starts the voltage to the armature is Low \_\_\_\_\_  
High \_\_\_\_\_. (Check one)

14. When using a direct current motor as a brake to slow the hoist, current flows  
Out of \_\_\_\_\_ Into \_\_\_\_\_ the motor. (Check one)

15. Some alternating current motors can be used as a brake by \_\_\_\_\_ the  
direction of rotation of the magnetic field.

16. Electrical machinery that is used in a mine where methane gas is a problem must  
be \_\_\_\_\_.

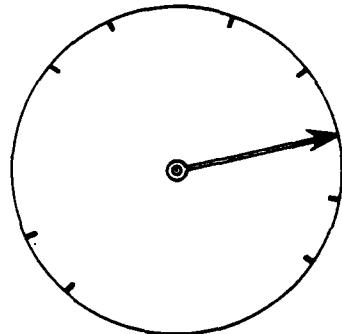
17. Fuses or circuit breakers must be provided to interrupt the flow of current before the  
conductors \_\_\_\_\_.

18. Exposed metal parts of electrical machinery that normally do not carry current must  
be \_\_\_\_\_.

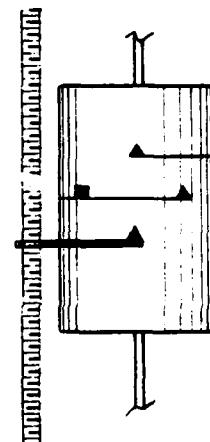
## TEST QUESTIONS FOR DEPTH INDICATOR

Answer the multiple-choice questions by filling in the blank with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

1. A depth indicator shows \_\_\_\_\_.
  - a. the vertical position of the conveyance in the shaft
  - b. the rope speed
  - c. the volts needed for cruising speed
  - d. the location of each communication system
  - e. none of the above
2. Below are two depth indicators. Label each dial or cylindrical.



A. \_\_\_\_\_



B. \_\_\_\_\_

3. A dial depth indicator has a/an \_\_\_\_\_ geared to the drum which moves around the \_\_\_\_\_.
  - a. shaft
  - b. arrow
  - c. flange
  - d. dial
  - e. cylinder
4. The marks shown on the dial of a depth indicator are the \_\_\_\_\_.
  - a. various rope speeds
  - b. position of the dump or collar
  - c. position of each working level
  - d. amounts of voltage needed for lowering and hoisting
  - e. b and c

5. Using a dial depth indicator, the hoist operator knows the conveyance is at a certain level because \_\_\_\_\_.
  - a. the arrow on the dial causes various bells to ring
  - b. the flanges on the drum are marked for each level
  - c. the arrow on the dial points to that position
  - d. a and b
  - e. none of the above
6. As the conveyance moves up and down the mine shaft, the indicator of a cylindrical depth indicator \_\_\_\_\_.
  - a. moves up and down the threaded shaft
  - b. moves horizontally across the drum
  - c. rotates around the drum
  - d. moves up and down the rope
  - e. none of the above
7. Using the cylindrical depth indicator, the hoist operators know when the conveyance is at a certain level because \_\_\_\_\_.
  - a. the cylinder indicator starts spinning over the mark
  - b. the cylinder indicator taps against the shaft for each level
  - c. the cylinder indicator stops over the mark for that position
  - d. the indicator on the conveyance causes various bells to ring
  - e. none of the above
8. The conveyance position may also be read easily and accurately by markings on the \_\_\_\_\_.
  - a. conveyance
  - b. wire rope
  - c. hoist motor
  - d. flanges of the drum
  - e. none of the above

## FEDERAL REGULATIONS

### Metal and Nonmetallic Mines

9. An accurate and reliable indicator of the position of the \_\_\_\_\_ in the shaft shall be provided.
  - a. skip
  - b. cage
  - c. bucket
  - d. cars
  - e. all of the above

### Coal Mines

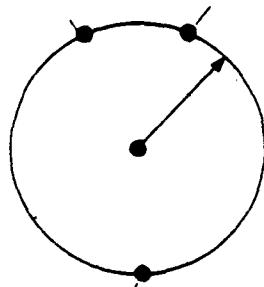
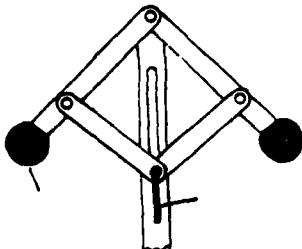
10. An accurate and reliable indicator of the position of the \_\_\_\_\_ shall be provided.
  - a. cage and skip
  - b. platform
  - c. bucket
  - d. cars
  - e. all of the above
11. The depth indicator shall be placed so that it is in clear view of the \_\_\_\_\_.
  - a. maintenance crew
  - b. hoisting engineer
  - c. people in the cage
  - d. foreman
  - e. none of the above
12. The depth indicator shall be checked \_\_\_\_\_ to determine its accuracy.
  - a. hourly
  - b. daily
  - c. weekly
  - d. monthly
  - e. yearly

## TEST QUESTIONS FOR SAFETY CONTROLLER

Fill in the blanks with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

1. The safety controller \_\_\_\_\_.
  - a. is a multi-purpose safety device
  - b. is synchronized with the movement of the drum shaft
  - c. prevents overspeed and overtravel
  - d. applies the brake of an electric hoist in case of power failure
  - e. all of the above
2. The power to the hoist motor is cut off and the brake is set if the drum \_\_\_\_\_ and the weights of the governor \_\_\_\_\_.
  - a. slows
  - b. overspeeds
  - c. move outward
  - d. stops
  - e. move toward the shaft
3. If the conveyance travels too far above the dump position or too far below the lowest level, power is cut by the \_\_\_\_\_ switches.
  - a. overtravel
  - b. overspeed
  - c. overload
  - d. a and c
  - e. none of the above
4. The basic controller consists of \_\_\_\_\_.
  - a. governor
  - b. depth indicator
  - c. pressure gauge
  - d. a and b
  - e. b and c
5. The controller permits higher speed only in the \_\_\_\_\_ stage.
  - a. acceleration
  - b. cruising
  - c. deceleration
  - d. a and b
  - e. a and c

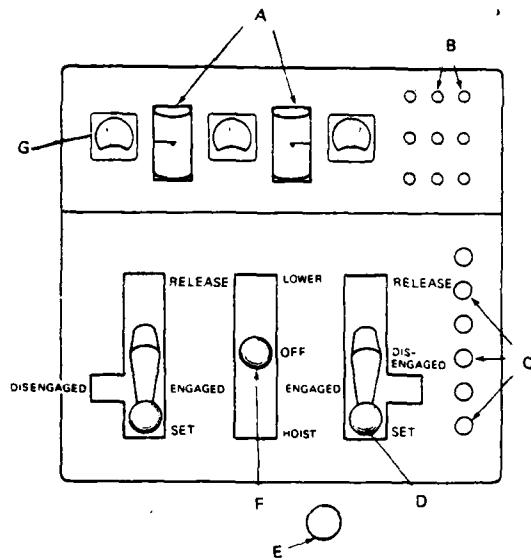
6. Label each illustration "depth indicator" or "governor."



## TEST QUESTIONS FOR THE HOIST CONTROL PANEL

Complete this sentence:

1. The hoist controls and indicators are within easy reach or sight of the hoist operator because they are grouped on a control \_\_\_\_\_.
2. Below is a typical hoist control panel. Label each lettered part deadman switch, meter, control pushbuttons, drum brake and clutch control, motor control, indicator lights, or depth indicators.



- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_
- D. \_\_\_\_\_
- E. \_\_\_\_\_
- F. \_\_\_\_\_
- G. \_\_\_\_\_

Fill in the blanks with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

3. Light indicators may \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.
  - a. show the condition of the bypass switches
  - b. show rope speed
  - c. show clutches engaged or disengaged
  - d. control the clutch
  - e. show safety gates opened or closed
4. Levers may be used for \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
  - a. clutch control
  - b. hoist motor control
  - c. communications control
  - d. electric brakes
  - e. current flow or voltage

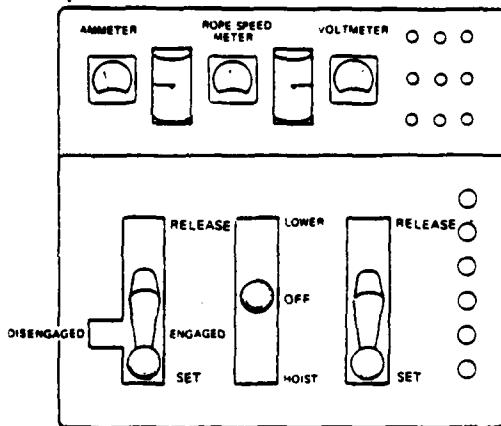
5. Meters may indicate \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.

- a. condition of bypass switches
- b. rope speed
- c. current flow or voltage
- d. lubrication oil, air or hydraulic pressure
- e. safety gates opened or closed

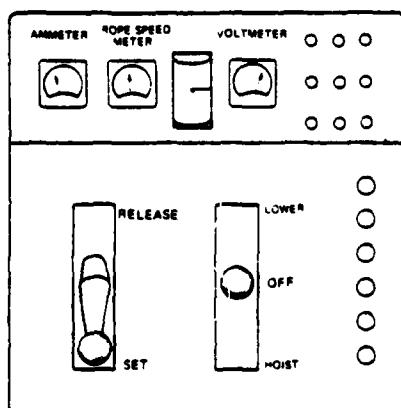
6. Depth indicators show the \_\_\_\_\_.

- a. rope speed
- b. position of conveyance in the shaft
- c. safety gates open or closed
- d. lubrication oil, air or hydraulic pressure
- e. condition of the bypass switches

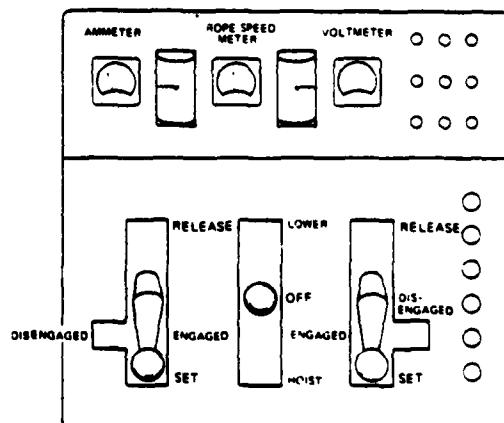
7. Label each illustration below single drum hoist; double drum hoist; single clutch; or double drum hoist, double clutch.



A. \_\_\_\_\_



B. \_\_\_\_\_



C. \_\_\_\_\_

### **Metal and Nonmetallic Mines**

8. An accurate and reliable indicator of the position of the \_\_\_\_\_ in the shaft shall be provided.
  - a. cage
  - b. bucket
  - c. skip
  - d. cars
  - e. all of the above
  
9. Hoist controls shall be placed or housed so that noise from machinery or other sources \_\_\_\_\_.
  - a. can drown out signals
  - b. won't prevent hoistman from hearing signals
  - c. won't allow signals to be heard
  - d. will prevent hoistman from hearing signals
  - e. none of the above

### **Underground Coal Mines**

10. An accurate and reliable indicator of the position of the \_\_\_\_\_ shall be provided.
  - a. cars
  - b. platform
  - c. bucket
  - d. cage or skip
  - e. all of the above
  
11. The indicator will be placed in clear view of the hoisting engineer and shall be checked \_\_\_\_\_ to determine its accuracy.
  - a. hourly
  - b. daily
  - c. weekly
  - d. monthly
  - e. yearly

## TEST QUESTIONS FOR COMMUNICATION SYSTEMS

Fill in the blank with the letter of the answer that best completes this sentence:

1. A communication system in a mine is used to \_\_\_\_\_.
  - a. communicate conditions
  - b. transfer information
  - c. provide a view of problem areas
  - d. request the movement of the conveyance
  - e. all of the above

Match the communication system in Column B with its use in Column A:

	<u>A</u>		<u>B</u>
2.	_____ used for longer messages		A. hoist bell
3.	_____ communicates conditions		B. telephone or radio
4.	_____ used to request or order the movement of the conveyance		C. public address
5.	_____ provides a view of likely problem areas		D. indicator lights
6.	_____ indicates a malfunction has occurred, the power is on or off or that a machine is operating		E. meters and gauges
7.	_____ used to pass information to many people over a wide area		F. closed circuit T.V.

Fill in the blank with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

### Metal and Nonmetallic Mines

8. There will be at least two approved methods of signaling between each of the shaft stations and the hoist room, one of which shall be a \_\_\_\_\_.
  - a. speaking tube
  - b. bell
  - c. telephone
  - d. indicator light
  - e. a or c

9. Hoist operators shall accept hoisting instructions only by the \_\_\_\_\_ unless it is out of order.
  - a. emergency signaling system
  - b. regular signaling system
  - c. public address
  - d. indicator light
  - e. none of the above
10. When the regular signaling system is out of order, or during other emergencies, the hoist operator shall accept instructions to direct movement of the conveyances \_\_\_\_\_.
  - a. by bell code
  - b. only by the public address system
  - c. only from authorized persons
  - d. from any miner
  - e. none of the above
11. There shall be a method to \_\_\_\_\_ from cages or other conveyances at any point in the shaft.
  - a. signal the mine superintendent
  - b. signal the hoist operator
  - c. cut power to the hoist motor
  - d. accelerate the conveyance to cruising speed
  - e. none of the above
12. A \_\_\_\_\_ of hoisting signals shall be adopted and used at each mine.
  - a. standard code
  - b. variety
  - c. rotating system
  - d. b and c
  - e. none of the above
13. The movement of a shaft conveyance on a \_\_\_\_\_ signal shall be prohibited.
  - a. "two bell"
  - b. telephone
  - c. "one bell"
  - d. bell
  - e. none of the above

14. A legible signal code shall be posted prominently in the hoist house \_\_\_\_\_.
  - a. within easy view of the hoistmen
  - b. at each place where signals are given
  - c. at each place where signals are received
  - d. a, b, c
  - e. none of the above
  
15. Any person responsible for \_\_\_\_\_ when men or materials are being transported shall be familiar with the posted signaling code.
  - a. receiving signals for cages
  - b. giving signals for cages
  - c. receiving or giving signals for skips
  - d. receiving or giving signals for mantrips
  - e. all of the above

#### **Underground Coal Mines**

16. There will be at least two approved methods of signaling between each of the shaft stations and the hoist room, one of which shall be \_\_\_\_\_.
  - a. speaking tube
  - b. bell
  - c. telephone
  - d. indicator light
  - e. a or c
  
17. One of the methods used to communicate between shaft stations and the hoist room shall give signals which can be \_\_\_\_\_ while men are underground.
  - a. heard at the dump level
  - b. heard by the hoisting engineer at all times
  - c. turned off
  - d. seen by the hoisting engineer at all times

18. Signaling systems used for communication between shaft stations and the hoist room shall be tested \_\_\_\_\_.
- a. hourly
  - b. daily
  - c. weekly
  - d. monthly
  - e. yearly

## TEST QUESTIONS FOR LUBRICATION

Complete these sentences with the correct answers:

1. Lubrication of mine equipment prevents \_\_\_\_\_ and is a major part of machinery maintenance.

2. The types of lubricant are \_\_\_\_\_ and \_\_\_\_\_.

Fill in the blanks with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

3. The hoist motor, overspeed and overtravel controls, air compressor, and hydraulic pump are examples of mine machinery that might have \_\_\_\_\_ to be lubricated.

- a. wheels
- b. joints
- c. bearings
- d. none of the above

4. The brake, clutch, safety dogs and limit switches are examples of mine machinery that might have \_\_\_\_\_ to be lubricated.

- a. wheels
- b. joints
- c. bearings
- d. none of the above

5. The shaft guides and conveyance guide shoes, and the hoist rope are examples of \_\_\_\_\_ that might have to be lubricated.

- a. wheels
- b. joints
- c. bearings
- d. surfaces that rub together

6. Label each illustration "grease gun," "oil reservoir," or "oil flow system."

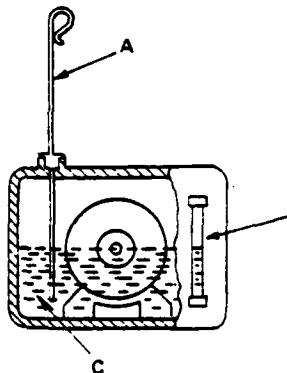


Figure 1

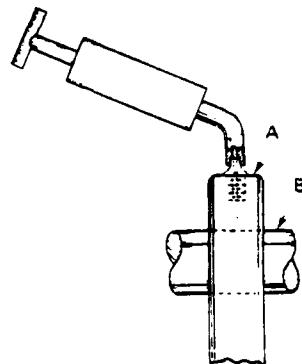


Figure 2

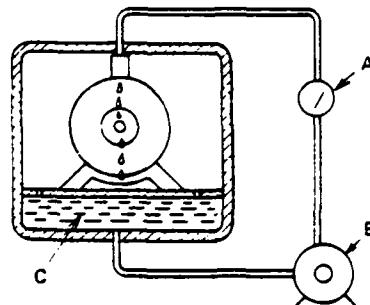


Figure 3

Write the name of each lettered part for Figures 1, 2 and 3:

7. Figure 1

- A. \_\_\_\_\_  
B. \_\_\_\_\_  
C. \_\_\_\_\_

8. Figure 2

- A. \_\_\_\_\_  
B. \_\_\_\_\_

9. Figure 3

- A. \_\_\_\_\_  
B. \_\_\_\_\_  
C. \_\_\_\_\_

Answer the questions below by filling in the blanks with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

10. The person responsible for lubricating the hoist must know \_\_\_\_\_.

- a. the parts to be lubricated
- b. the method of lubricating each part
- c. the type of lubricant to be used
- d. the location of the lubricant storage
- e. all of the above

**Federal Regulations for Metal and Nonmetallic Mines**

11. Complete records shall be kept for three years of \_\_\_\_\_ shafts and hoisting equipment.
  - a. tests
  - b. inspections
  - c. maintenance
  - d. all of the above
  - e. none of the above
  
12. Wire ropes shall be lubricated or treated with dressing \_\_\_\_\_.
  - a. hourly
  - b. yearly
  - c. as recommended or approved by the rope manufacturer
  - d. as recommended or approved by the hoist operator
  - e. none of the above
  
13. Sheaves in operating shafts shall be inspected \_\_\_\_\_ and kept properly lubricated.
  - a. hourly
  - b. daily
  - c. weekly
  - d. yearly
  - e. none of the above
  
14. Rollers used in operating inclined shafts shall be \_\_\_\_\_.
  - a. kept in good repair
  - b. lubricated
  - c. properly aligned
  - d. all of the above
  - e. a and c

## TEST QUESTIONS FOR INSPECTION

Fill in the blanks with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

1. Periodic inspections of the \_\_\_\_\_ are made to assure that operations can be conducted safely.
  - a. hoist
  - b. shaft
  - c. related mine hoist parts
  - d. all of the above
  - e. none of the above
  
2. To inspect the mine hoist properly, the hoist operator must know \_\_\_\_\_.
  - a. hoist parts that require inspection
  - b. how often hoist parts require inspection
  - c. method of recording information in the log
  - d. conditions which indicate maintenance or attention is required
  - e. all of the above

## FEDERAL REGULATIONS

### Metal and Nonmetallic Mines

3. A systematic inspection procedure for shaft and hoisting equipment shall be \_\_\_\_\_.
  - a. developed
  - b. considered
  - c. followed
  - d. a and c
  - e. none of the above
  
4. The hoist equipment shall not be used if \_\_\_\_\_ is found or suspected.
  - a. a damaged log
  - b. a malfunction
  - c. too small a load
  - d. a and c
  - e. none of the above

5. Complete records shall be kept for three years of inspections, tests, and maintenance of the \_\_\_\_\_.
  - a. shaft
  - b. hoisting equipment
  - c. a and b
  - d. none of the above
6. At the beginning of each shift the hoist operator shall examine the hoist and test \_\_\_\_\_.
  - a. overtravel and deadman controls
  - b. position indicators and braking mechanisms
  - c. the ore from the previous shift
  - d. all of the above
  - e. a and b
7. Before hoisting persons and to assure that the hoisting compartments are clear of obstructions, empty hoist conveyances shall be operated at least one round trip after \_\_\_\_\_.
  - a. Blasting in or near the shaft that might restrict or obstruct conveyance clearance
  - b. Remaining idle for one shift or longer
  - c. Any hoist or shaft repairs or related equipment repairs that might restrict or obstruct conveyance clearance
  - d. Any oversize or overweight material or equipment trips that might restrict or obstruct conveyance clearance
  - e. All of the above
8. During any 24 hour period the conveyance is used for hoisting people, conveyance connections shall be inspected at least \_\_\_\_\_.
  - a. twice
  - b. after each complete trip the conveyance makes
  - c. once
  - d. 3 times
  - e. none of the above
9. After installation and before use, and at the beginning of any \_\_\_\_\_ period during which the conveyance is to be used, the conveyance shall be suitably rested and the hoist rope slackened to test for the unrestricted functioning of the safety catches and their activating mechanisms.
  - a. One (1) day
  - b. Three (3) days
  - c. Seven (7) days
  - d. One (1) month
  - e. None of the above

10. The safety catches shall be inspected by a competent person at the beginning of any \_\_\_\_\_ period that the conveyance is to be used.
- 24 hour
  - 3 day
  - one (1) week
  - one (1) month
  - none of the above
11. Shafts that have not been inspected within the past \_\_\_\_\_ shall not be used until an inspection has been conducted by a competent person.
- day
  - 7 days
  - month
  - year
  - none of the above
12. Sheaves in operating shafts shall be inspected \_\_\_\_\_ and kept properly lubricated.
- daily
  - weekly
  - monthly
  - yearly
  - none of the above
13. Rollers used in operating inclined shafts shall be \_\_\_\_\_.
- lubricated
  - properly aligned
  - replaced at the beginning of any 24 hour period
  - kept in good repair
  - a, b, d
14. Hoist ropes shall be examined over the entire active length at least every \_\_\_\_\_ to evaluate wear and possible damage.
- day
  - week
  - month
  - year
  - none of the above

15. When examinations or other inspections reveal that the rope is worn, and at least every six (6) months, caliper measurements or nondestructive tests shall be made \_\_\_\_\_.
- Where the ropes leave the drums when the conveyances are at the regular stopping point
  - Wherever wear is evident, and where the rope rests on the sheaves
  - Immediately above the socket or clip and above the safety connection
  - Where a layer of rope begins to overlap another layer on the drum, and at 100 foot intervals
  - All of the above
16. Ropes shall not be used for hoisting when they have \_\_\_\_\_.
- more than 6 broken wires in any lay
  - crown wires worn to less than 65 percent of the original diameter
  - a marked amount of corrosion or distortion
  - a combination of factors that might create an unsafe condition
  - all of the above
17. Hoist ropes other than those on friction hoists shall be cut off at least six (6) feet above the highest connection to the conveyance at time intervals not to exceed \_\_\_\_\_.
- one day
  - one month unless a shorter time is required by standard 57.19-126
  - one year unless a shorter time is required by standard 57.19-126 or by conditions of use
  - two years
  - none of the above
18. The portion of the rope that is cut off (question 17) shall be examined and inspected by a competent person for \_\_\_\_\_.
- wear
  - fatigue
  - damage
  - corrosion
  - all of the above
19. Hoist ropes wound in multiple layers shall have a length cut off at the drum end at least three (3) times during the anticipated life of the rope and whenever necessary as required by standard 57.19-126 to \_\_\_\_\_.
- lubricate the rope
  - distribute the wear at change-of-layer points
  - distribute the wear at crossover points
  - b and c
  - none of the above

20. The length of rope cut off (question 19) shall not be a whole number multiple of the circumference of the \_\_\_\_\_.  
a. drum  
b. sheave  
c. rope  
d. shaft  
e. none of the above

#### Coal Mines

21. Records shall be kept of tests performed on safety catches and other devices. Each entry shall be \_\_\_\_\_.  
a. signed by the person making the test  
b. signed by the men on the shift  
c. countersigned by a responsible official  
d. a and c  
e. all of the above
22. The daily examination of hoisting equipment shall include, but not be limited to \_\_\_\_\_.  
a. visual examination of the rope for wear, broken wires and corrosion  
b. an examination of the rope fastenings for defects  
c. an examination of safety catches  
d. all of the above  
e. none of the above
23. The daily examination of hoisting equipment shall include but not be limited to \_\_\_\_\_.  
a. an examination of the cage, platforms, elevators, or other devices for loose, missing or defective parts  
b. an examination of the head sheaves  
c. an observation of the lining and all other equipment installed in the shaft  
d. all of the above  
e. none of the above

24. Records of the daily examinations of hoisting equipment shall be kept listing all items examined, and \_\_\_\_\_.
- daily entries shall be signed by the people making examinations
  - The reports of the examinations will be read and countersigned daily by a responsible company official
  - daily entries will be signed by the men on the shift
  - all of the above
  - a and b
25. Signaling systems used for communication between shaft stations and the hoist room shall be tested \_\_\_\_\_.
- hourly
  - daily
  - weekly
  - monthly
  - yearly

## TEST QUESTIONS FOR MAINTENANCE

Complete this sentence with the correct answer:

1. Maintenance in a mine is the work that is done to keep the mine hoist parts \_\_\_\_\_.

Fill in the blanks with the letter of the answer that best completes the sentence. Read all of the choices before selecting your answer.

2. Maintenance includes \_\_\_\_\_.

- a. housekeeping and inspection
- b. lubrication and repairs
- c. adjustments and replacement of parts
- d. all of the above
- e. a and c

3. Repairing, adjusting, or replacing parts before they break down is \_\_\_\_\_ maintenance.

- a. unnecessary
- b. preventive
- c. corrective
- d. annual
- e. none of the above

4. Repairing or replacing parts after they break down is \_\_\_\_\_ maintenance.

- a. unnecessary
- b. preventive
- c. corrective
- d. annual
- e. none of the above

5. Maintenance instructions come from \_\_\_\_\_.

- a. procedures put out by mine managers
- b. local regulations
- c. federal and state regulations
- d. manufacturers' maintenance manuals
- e. all of the above

### Federal Regulations for Metal and Nonmetallic Mines

6. When people are working in the shaft or in a compartment that will be affected by the hoist operation \_\_\_\_\_.

- a. a "Men Working in Shaft" sign shall be posted at the hoist
- b. the hoist operator shall be informed of the situation
- c. a "Men Working in Shaft" sign shall be posted at all devices controlling hoisting operations
- d. all of the above
- e. none of the above

7. Parts used to repair hoists shall have properties that will insure the \_\_\_\_\_ of the hoist.
  - a. lubrication
  - b. proper function
  - c. safe function
  - d. b and c
  - e. none of the above
  
8. Shaft inspection and repair work done in vertical mines shall be performed from \_\_\_\_\_.
  - a. skips
  - b. substantial platforms
  - c. substantial platforms equipped with bonnets or equivalent overhead protection
  - d. ladders attached to the sides of the shaft
  - e. none of the above

## TEST QUESTIONS FOR SAFETY FEATURES

Match the safety feature in Column B with its use in Column A.

- | A   | B                         |
|---|---------------------------|
| 1. _____ cuts off hoist power and applies brake if rope goes slack or breaks                | A. cage bonnet            |
| 2. _____ grips shaft guides and prevents conveyance from falling if rope breaks             | B. deadman switch         |
| 3. _____ cuts off hoist power and applies brake if conveyance travels too fast              | C. rope strength          |
| 4. _____ cuts off hoist power if conveyance travels too far up or too far down in the shaft | D. overtravel control     |
| 5. _____ prevents clutch disengagement unless brake is applied                              | E. slack rope switch      |
| 6. _____ protects persons in cage from falling objects                                      | F. clutch-brake interlock |
| 7. _____ prevents persons and objects from falling into an open shaft                       | G. safety gate            |
| 8. _____ provides communication links between hoist operator and persons in or near shaft   | H. overspeed control      |
| 9. _____ cuts hoist power and applies brake if hoist operator is disabled                   | I. communication systems  |
| 10. _____ reduces probability of rope breaking because of additional strain                 | J. safety dog             |

Fill in the blanks with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

11. Safe operation of the mine hoist depends upon the hoist operator's \_\_\_\_\_.
- a. knowledge of the hoist operation
  - b. positive attitude toward the job
  - c. alertness
  - d. all of the above
  - e. none of the above

12. The hoist operator contributes to safety by proper \_\_\_\_\_ procedures.
- a. operation
  - b. housekeeping
  - c. inspection
  - d. maintenance
  - e. all of the above
13. Safety practices may be found in \_\_\_\_\_.
- a. state regulations
  - b. federal regulations
  - c. local regulations
  - d. established operating procedures
  - e. all of the above

## TEST QUESTIONS FOR THE ELECTRICAL SYSTEM (Fundamental)

Match the symbol or definition in Column B to the correct word in Column A.

<u>A</u>	<u>B</u>
1. _____ voltage	A. opposition to the flow of electricity
2. _____ current	B. amount of energy used
3. _____ resistance	C. R
4. _____ symbol for volts	D. pressure causing flow of electrons
5. _____ symbol for amperes	E. I
6. _____ symbol for resistance	F. E
	G. P
	H. rate of flow of electrons

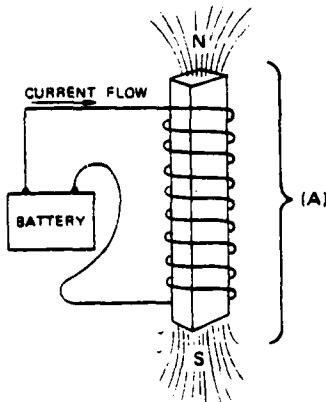
Answer the following questions by filling in the blank, choosing the correct answer or solving the problem.

7. A unit of electrical pressure is a/an \_\_\_\_\_.
8. A unit of current is a/an \_\_\_\_\_.
9. A unit of resistance is a/an \_\_\_\_\_.
10. A/an \_\_\_\_\_ is a substance that has low resistance to electricity.
11. The formula for Ohm's Law is \_\_\_\_\_.
12. If there are 240 volts going into a 12 ohm circuit, how many amperes are flowing? \_\_\_\_\_
13. Twenty-five amperes are flowing in a 125 volt circuit, what is the resistance?  
\_\_\_\_\_
14. Find the current flow in a 110 volt parallel circuit with 3 resistances:  $R_1 = 10$ ;  $R_2 = 11$ ;  $R_3 = 22$ . \_\_\_\_\_
15. Find the current flow in a 100 volt series circuit with 5 resistances:  $R_1 = 5$ ;  $R_2 = 2$ ;  $R_3 = 8$ ;  $R_4 = 2$ ;  $R_5 = 3$ . \_\_\_\_\_

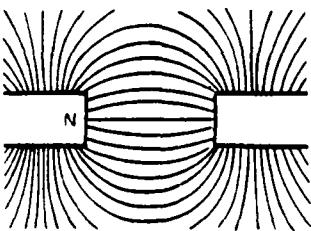
16. Some commonly used insulators are \_\_\_\_\_.  
a. rubber  
b. aluminum  
c. porcelain  
d. a and c  
e. b and c
17. The perfect conductor is \_\_\_\_\_.  
a. gold  
b. copper  
c. carbon  
d. rubber  
e. nonexistent
18. A/an \_\_\_\_\_ is equal to the area of the cross-section of a round wire that is 1/1000 of an inch in diameter.  
a. kilowatt  
b. foot pound  
c. circular mil  
d. mil  
e. none of the above
19. Current is measured by a/an \_\_\_\_\_.  
a. voltmeter  
b. ammeter  
c. rheostat  
d. watt hour meter
20. Voltage is measured by a/an \_\_\_\_\_.  
a. voltmeter  
b. ammeter  
c. rheostat  
d. watt hour meter
21. If a hoist lifts 900 pounds 20 feet in 10 seconds, how many foot pounds per second of power does it use? \_\_\_\_\_
22. How much work is done by a motor that raises 650 pounds 9 feet? \_\_\_\_\_
23. A motor raises a 50 pound load 5 feet per second for 10 seconds. How much work is done? \_\_\_\_\_
24. One horsepower is the power needed to do \_\_\_\_\_ foot pounds of work in one second or \_\_\_\_\_ foot pounds of work in one minute.  
a. 50  
b. 500  
c. 550  
d. 33,000  
e. 330

25. How many horsepower are needed to run the hoist if 11,000 pounds of ore are to be lifted at a speed of 300 feet per minute? (Ignore friction losses)  
\_\_\_\_\_
26. The power of a 75 horsepower motor can be expressed as \_\_\_\_\_ watts.
27. 7,000 watts = \_\_\_\_\_ kilowatts.
28. If 220 volts cause 15 amperes to flow in a circuit, the power used is \_\_\_\_\_ watts.
29. If 2200 watts are used for 2 hours, how many watt hours of work are done?  
\_\_\_\_\_
30. How much power is used if 110 volts cause 15 amperes to flow in a circuit?  
\_\_\_\_\_
31. Work done by an electrical machine is measured by a/an \_\_\_\_\_.  
a. voltmeter  
b. ammeter  
c. rheostat  
d. watt hour meter
32. The power used in a circuit is \_\_\_\_\_ watts if there are 18 amperes flowing through 20 ohms resistance.
33. Electricity is usually transmitted at very high \_\_\_\_\_ and low \_\_\_\_\_ since line losses increase rapidly as current is increased.  
a. resistance  
b. voltage  
c. current  
d. amperage
34. Suppose a motor draws 10 amperes at a normal load. If the conductor to the motor is damaged, how many watts of power per ohm of resistance are lost and turn to heat?  
\_\_\_\_\_
35. A fire hazard may be created by \_\_\_\_\_.  
a. poor electrical connections  
b. electrical conductors that are too small  
c. damaged conductors  
d. all of the above

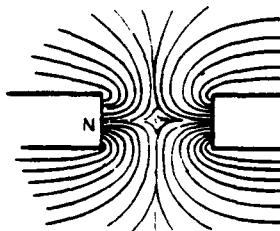
36. What kind of a magnet is (a)? \_\_\_\_\_ If we reverse the current flow, will the N pole be at the Top \_\_\_\_\_ or Bottom \_\_\_\_\_.



37. These poles attract each other. The one on the right is a \_\_\_\_\_ Pole.



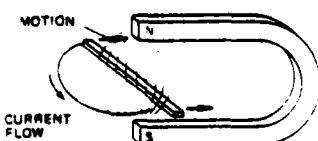
These poles repel each other. The one on the right is a \_\_\_\_\_ Pole.



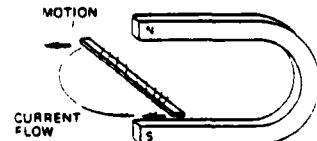
38. In the first figure the motion of the conductor is from left to right and current flows as shown by the arrow.

In the second figure the motion of the conductor is from right to left. Show by an arrow which way the current will flow.

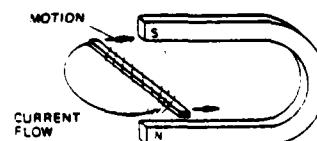
In the third figure the motion of the conductor is the same as in the 1st figure but the position of the poles is reversed. Indicate the direction of current flow.



(1)

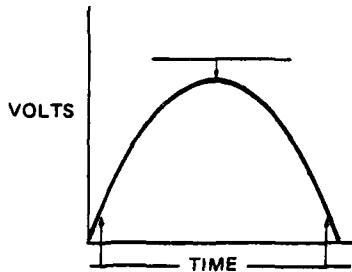


(2)



(3)

39. This is a diagram of the voltage generated in a wire as it passes through a magnetic field. Indicate (with an arrow) where it enters the field, where it is in the center of the field, and where it is leaving the field.



40. If the number of wire turns on the current flow of a magnetic field is increased, the strength of the magnetic field \_\_\_\_\_.  
a. remains the same  
b. decreases  
c. increases  
d. reverses the turn of the armature
41. \_\_\_\_\_ current flows in one direction, then another; \_\_\_\_\_ current flows in one direction.
42. \_\_\_\_\_ current is more dangerous than \_\_\_\_\_ current.  
a. direct  
b. magnetic  
c. armature  
d. alternating
43. Direct current voltage can be lowered by passing it through a/an \_\_\_\_\_.  
a. rheostat  
b. commutator  
c. motor  
d. phase

44. A/an \_\_\_\_\_ changes rotary motion into electrical energy; a/an \_\_\_\_\_ turns electrical energy into rotary motion.
- electric motor
  - generator or dynamo
  - field magnet
  - transformer
45. The principal parts of a direct current electric motor are \_\_\_\_\_.
- brushes, armature, transformer, field magnets
  - brushes, dynamo, commutator, transformer
  - brushes, armature, commutator, field magnets
  - armature, commutator, field magnets

#### Principles of Electric Motor Operation

46. Reversing the flow of current through the coil of an electromagnet \_\_\_\_\_.
- reverses the dynamo
  - stops the armature
  - increases the armature current
  - reverses the poles of the magnet
47. When the brushes of a direct current motor change commutator segments, the current flow or voltage in the armature coil \_\_\_\_\_.
- stops the armature
  - is reversed
  - reverses the dynamo
  - starts the dynamo
48. The magnetic forces that rotate the armature are increased by \_\_\_\_\_.
- increasing the armature current
  - reversing the armature current
  - removing the brushes
  - decreasing the armature current
49. Power output of the motor is decreased by \_\_\_\_\_.
- increasing the armature current
  - reversing the armature current
  - removing the brushes
  - decreasing the armature current
50. Changing the direction of current flow in either the armature or the \_\_\_\_\_ reverses a direct current motor.
- field coils
  - rheostat
  - voltmeter
  - ammeter

51. Each column describes a generator; what is the output for each?

Strong Field	Slow Rotation
Fast Rotation	Weak Field
_____ Output	_____ Output

52. Fill in the following for an alternating current motor using high, medium or low.

<u>Slip</u>	<u>Armature Current Flow</u>	<u>Power Output</u>
High	_____	_____
Medium	_____	_____
Low	_____	_____

53. \_\_\_\_\_ commutator brushes are hard and cause wear on the motor commutator but they last longer than other types of brushes.

- a. carbon
- b. rubber
- c. porcelain
- d. copper

54. \_\_\_\_\_ commutator brushes cause little commutator wear but they chip and cause sparking.

- a. carbon
- b. rubber
- c. porcelain
- d. copper

55. A wire that is connected to each commutator brush and the power supply is called a/an \_\_\_\_\_.

- a. rheostat
- b. shunt
- c. pigtail
- d. resistor

56. Sparking of commutator brushes may be corrected by \_\_\_\_\_.

- a. chipping the brushes
- b. changing the armature current
- c. changing the position of the brush
- d. reversing the motor

57. Sparking of commutator brushes may be caused by \_\_\_\_\_.

- a. broken brushes
- b. ground wires
- c. a worn commutator
- d. a and c

58. Current generated in the armature coil of a direct current generator is changed from alternating current to direct current as it passes through the \_\_\_\_\_.  
a. field coils  
b. commutator  
c. resistance  
d. ammeter
59. Voltage generated in a direct current generator increases as the \_\_\_\_\_ and the speed of the armature increase.  
a. weakness of the field  
b. strength of the field  
c. speed of the commutator  
d. speed of the brushes
60. Current flow through the armature coils of an alternating current motor is caused by \_\_\_\_\_.  
a. an induced voltage  
b. low slip  
c. sparking  
d. voltage in the field coils
61. When slip is high, an alternating current motor has \_\_\_\_\_ power output.  
a. low  
b. no  
c. high  
d. partial
62. Increasing the current flow in the \_\_\_\_\_ increases the speed of direct current motors and alternating current motors.  
a. field coils  
b. commutator  
c. armature  
d. ammeter
63. Full voltage applied to a direct current motor armature that is stopped \_\_\_\_\_.  
a. will reverse the motor  
b. can cause damage  
c. can reverse the poles of electromagnet  
d. decreases the slip
64. If a voltage drop causes the armature of a running DC motor to slow and stop, enough current may be forced through the armature to \_\_\_\_\_.  
a. reverse the armature rotation  
b. decrease the slip  
c. reverse the poles of the electromagnet  
d. burn the armature coils

65. Voltage to the armature in a mine hoist motor can be increased by \_\_\_\_\_.  
a. blowing a fuse  
b. strengthening or weakening the DC generator magnetic field  
c. changing the output voltage of the rectifier  
d. b and c
66. A \_\_\_\_\_ motor has the field coil and the armature in parallel; they are both connected across the power supply.  
a. shunt  
b. compound  
c. series  
d. parallel
67. A \_\_\_\_\_ motor has one terminal of the field coil connected to one terminal of the armature; the two are then connected across the power supply.  
a. shunt  
b. compound  
c. series  
d. parallel
68. A \_\_\_\_\_ motor has two fields.  
a. shunt  
b. compound  
c. series  
d. parallel
69. Current for the main generator magnetic fields can be provided by a/an \_\_\_\_\_.  
a. voltmeter  
b. exciter generator  
c. transformer  
d. ammeter
70. A direct current motor can be used as a brake by \_\_\_\_\_.  
a. using alternating current in the motor armature  
b. increasing the voltage to the motor armature  
c. reducing the voltage to the motor armature  
d. a and c
71. An alternating current motor can be used as a brake by \_\_\_\_\_.  
a. reducing the current flow to the armature  
b. reversing the rotating field  
c. substituting direct current in one or two of the phases  
d. b and c

72. Alternating current voltage is raised by a/an \_\_\_\_\_ and lowered by a/an \_\_\_\_\_
- step-down transformer
  - step-up transformer
  - rheostat
  - laminations
73. It is more economical and safer to have \_\_\_\_\_ where power is transmitted and to have \_\_\_\_\_ where power is used.
- high voltage
  - low voltage
  - alternating current
  - direct current
74. \_\_\_\_\_ reduce the flow of eddy currents.
- ammeters
  - transformers
  - laminations
  - commutators
75. A transformer has \_\_\_\_\_.
- primary coil
  - secondary coil
  - common core
  - all of the above
76. The build up of magnetism in the core of a transformer causes a voltage to be generated in the \_\_\_\_\_.
- secondary coil
  - primary coil
  - commutator
  - brushes
77. As the current reverses itself in the primary coil of a transformer, the magnet is reversed and causes a reverse voltage to be generated in the \_\_\_\_\_.
- secondary coil
  - commutator
  - brushes
  - ammeter
78. The power flowing into the primary coil of a transformer is \_\_\_\_\_ the power flowing out of the secondary coil.
- about 6 watts less than
  - about 6 watts more than
  - about equal to
  - twice the amount of

79. The voltage going into the primary coil and the voltage going out of the secondary coil of a transformer are proportional to the number of \_\_\_\_\_.  
a. coils in the transformer  
b. brushes on the commutator  
c. turns of wire in each coil  
d. pigtails
80. Suppose a transformer is as follows:
- |                        |                        |
|------------------------|------------------------|
| P <sub>p</sub> = 1100  | P <sub>s</sub> = _____ |
| N <sub>p</sub> = 110   | N <sub>s</sub> = 50    |
| E <sub>p</sub> = 110   | E <sub>s</sub> = _____ |
| I <sub>p</sub> = _____ | I <sub>s</sub> = _____ |
- What is P<sub>s</sub> \_\_\_\_\_? I<sub>p</sub> \_\_\_\_\_?
81. In the above transformers what is E<sub>s</sub> \_\_\_\_\_?
82. What is I<sub>s</sub> \_\_\_\_\_?
83. Flammable materials used near sparking electrical machinery \_\_\_\_\_.  
a. could cause a fire  
b. could create a safety hazard  
c. can't cause a fire because of conductors  
d. a and b
84. Federal regulations require that electrical machinery used where flammable dust, gas or vapors may be present must \_\_\_\_\_.  
a. be enclosed  
b. use direct current  
c. use a transformer  
d. have a shunt motor
85. Every electrical circuit must have conductors that \_\_\_\_\_ without overheating.  
a. are large enough to carry the normal circuit flow  
b. are made of silver  
c. can carry an acceptable overload (25%)  
d. a and c
86. Chemical changes from an electric current flowing through a mixture of dissolved metallic compounds and water are called \_\_\_\_\_.  
a. rotation  
b. grounding  
c. electrolysis  
d. transforming

87. The voltage difference between metal structures in moist areas can be reduced by the \_\_\_\_\_ of all equipment.
- transforming
  - grounding
  - electrolysis
  - b and c
88. To prevent over current flow, a piece of metal called a/an \_\_\_\_\_ is placed in the circuit in series with the load.
- circuit breaker
  - armature
  - fuse
  - commutator
89. Too many amperes flowing through this piece of metal (see question 85) generate heat which melts it and \_\_\_\_\_.
90. A magnetic switch preventing over current flow which is placed in the circuit in series with the load is called a/an \_\_\_\_\_.
- circuit breaker
  - armature
  - fuse
  - commutator
91. The circuit will be broken by a/an \_\_\_\_\_ if lightning strikes the power line.
- ammeter
  - voltmeter
  - lightning arrester
  - commutator
92. The state of Illinois permits a maximum voltage of \_\_\_\_\_ watts on exposed wires.
93. Before personnel can work on electrical equipment, \_\_\_\_\_.
- power must be on
  - power must be cut off from the equipment
  - measures must be taken to prevent the return of power to machines until work is completed
  - b and c

## TEST QUESTIONS FOR BEGINNING OF SHIFT ACTIVITIES

The hoist operator visually inspects the hoist at the beginning of the shift. Match each hoist part in Column A with the letters of its possible defects from Column B:

- | <u>A</u>                                      | <u>B</u>   |
|---|--|
| 1. _____ hoist anchorage, structure, and drum | A. burned or worn contacts                         |
| 2. _____ brakes                               | B. frayed insulation                               |
| 3. _____ wiring                               | C. loose connections                               |
| 4. _____ hoist rope                           | D. loose couplings on conveyance and safety cables |
|   | E. structural cracks                               |
|   | F. loose bolts and nuts                            |
|   | G. abnormal hydraulic or pneumatic pressure        |
|   | H. loose shoes or worn bands                       |
|   | I. no slack in safety cable                        |
|   | J. needs lubrication                               |

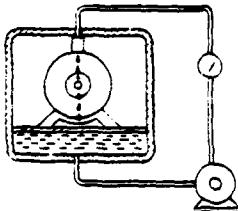
Complete this sentence with the correct answers:

5. The hoist operator finds out what happened on the previous shift by \_\_\_\_\_ and \_\_\_\_\_.

Fill in the blanks with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

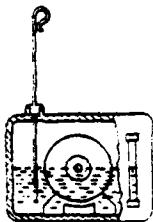
6. Complete records of \_\_\_\_\_ of shafts and hoisting equipment will be kept in logs.
- a. installation
  - b. lubrication and maintenance
  - c. inspection and tests
  - d. b and c
  - e. all of the above
7. The hoist operator runs the empty conveyance the length of the shaft \_\_\_\_\_.  
a. at slow speed  
b. to assure that the shaft is clear  
c. to assure that the controls operate properly  
d. at cruising speed  
e. a, b and c

8. To lubricate the hoist with an installed grease system, the hoist operator \_\_\_\_\_.
- inspects for grease at the lubrication points
  - tests the operation of the system
  - checks the supply of grease in the reservoir
  - all of the above
9. Below is a picture of an oil flow system. Part of the inspection steps are given. Fill in the blanks with the word that best completes each step.



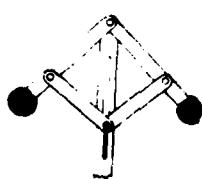
- Inspect oil supply in the \_\_\_\_\_.
- Inspect \_\_\_\_\_ (look at pressure gauge)
- Inspect for \_\_\_\_\_.
- Inspect sight glass for normal \_\_\_\_\_.
- Request \_\_\_\_\_ if necessary.

10. Below is a picture of an oil reservoir system. Part of the inspection steps are given. Fill in the blanks with the word that best completes each step.



- Inspect oil supply in the \_\_\_\_\_.
- Inspect bearings for \_\_\_\_\_.
- Request \_\_\_\_\_.

11. Below is a picture of a safety controller and the steps followed to test the overspeed cutout. Number the steps in the order they are performed.



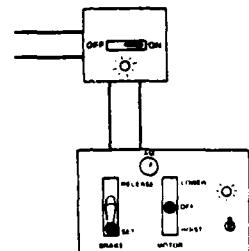
- \_\_\_\_ Manually raise weights on the governor
- \_\_\_\_ Check to see that main power switch opens (power is OFF)
- \_\_\_\_ Set the brake and stop the hoist
- \_\_\_\_ Close main power switch if it opens

12. Below is an illustration of the deadman switch. To test the deadman switch the hoist operator tries to apply power to the hoist while \_\_\_\_\_.

- his/her foot or knee is pressing the switch
- his/her foot or knee is not pressing the switch

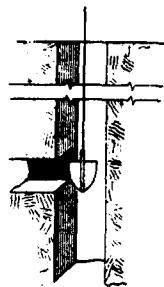


13. To test the power to the hoist control stand, the hoist operator will \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_. (Put in the order they are done. Some may be used more than once).



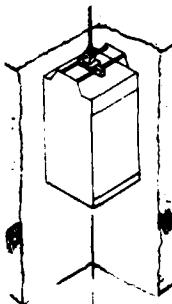
- a. request assistance if test fails
- b. move motor control in one direction
- c. note deflection of ammeter
- d. close the power switch
- e. move motor control in the other direction

14. Below is a picture of a conveyance in a shaft, and the steps the hoist operator follows to test the overtravel cutout switch. Number the steps in the order they are performed. (Assume the power switch opens)



- \_\_\_\_\_ Return conveyance to normal operating area
- \_\_\_\_\_ Move the conveyance above/below the collar/deepest landing
- \_\_\_\_\_ Set the brake and put the motor control on OFF
- \_\_\_\_\_ Close the overtravel bypass switch

15. Below is a picture of a conveyance in a shaft, and the steps the hoist operator follows to test the slack rope switch and the conveyance safety dogs. Number the steps in the order they are performed. (Assume the test is successful)



- \_\_\_\_\_ Slack the hoist rope
- \_\_\_\_\_ Set the brake
- \_\_\_\_\_ Put motor control on OFF
- \_\_\_\_\_ Support the conveyance
- \_\_\_\_\_ Remove the supports
- \_\_\_\_\_ Raise conveyance slowly until it is lifted off the supports if beams are used.
- \_\_\_\_\_ Close slack rope bypass switch

## TEST QUESTIONS FOR ROUTINE SHIFT ACTIVITIES

Complete this sentence with the correct answers:

1. The hoist operator's basic job is to move a/an \_\_\_\_\_ from one level to another quickly and \_\_\_\_\_.
2. The five steps a conveyance is moved in are listed below. Number them in the order they are performed:

- \_\_\_\_\_ Cruise
- \_\_\_\_\_ Stop
- \_\_\_\_\_ Decelerate
- \_\_\_\_\_ Start
- \_\_\_\_\_ Accelerate

Fill in the blanks with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

3. The deadman switch is \_\_\_\_\_ when hoisting people.
  - a. open (turned off)
  - b. closed (turned on)
4. To start the conveyance moving, apply power \_\_\_\_\_ and \_\_\_\_\_ the brake.
  - a. slowly
  - b. quickly
  - c. release
  - d. apply
5. The \_\_\_\_\_ and \_\_\_\_\_ must be kept within allowable limits during acceleration.
  - a. depth indicator
  - b. loading level
  - c. rope speed
  - d. current flow
6. The hoist operator may use \_\_\_\_\_ to prevent excessive conveyance speed.
  - a. the motor control
  - b. the hydraulic brake
  - c. the mechanical brake
  - d. electrical braking
  - e. all of the above

7. When the hoist operator reduces power and speed during deceleration, he/she watches the \_\_\_\_\_ and \_\_\_\_\_.  
a. deadman by pass switch  
b. rope speed meter  
c. brake  
d. depth indicator
8. As the conveyance approaches the destination, the hoist operator closely watches the markings on the \_\_\_\_\_ or \_\_\_\_\_.  
a. conveyance  
b. depth indicator  
c. drum  
d. rope  
e. brake
9. When the signal to stop is received, the hoist operator sets the brake and \_\_\_\_\_.  
a. applies more power  
b. cuts off the power  
c. turns off the safety controller  
d. a and c  
e. none of the above

Complete this sentence with the correct answer.

10. People and materials may not be raised or lowered at the same time in the same shaft during \_\_\_\_\_.

Below are the steps for raising ore manually and automatically. Choose the hoist operation that is similar to the one you will be operating and number the steps in the order they are performed.

11. Manual operation

Single Level Mine — Single Skip Hoist

- \_\_\_\_\_ Receive and interpret signal to hoist when skip is full
- \_\_\_\_\_ Hold skip at the dump with brake or low power application
- \_\_\_\_\_ Lower skip to work level
- \_\_\_\_\_ Raise skip to dump level
- \_\_\_\_\_ When skip is empty, lower to work level and repeat

**12. Manual Operation**

**Single Level Mine — Double Skip Hoist**

- \_\_\_\_\_ Raise the first skip to the dump level when it is full; this action lowers the second skip to the loading level
- \_\_\_\_\_ Lower one skip to loading level; this action raises the other skip to dump level
- \_\_\_\_\_ Repeat the first step when the first skip is dumped and the second skip is loaded.

**13. Manual Operation**

**Multi-Level Mine — Double Skip Hoist (with clutch)**

- \_\_\_\_\_ Disengage clutch and lower the second skip to the desired level
- \_\_\_\_\_ Raise one skip to the dump level; apply brake
- \_\_\_\_\_ Re-engage clutch when second skip is in position
- \_\_\_\_\_ Repeat loading procedure when the full skip is dumped and the empty skip is loaded
- \_\_\_\_\_ Raise full skip to dump level; this action lowers other skip to the loading level

**14. Automatic Product Hoist**

- \_\_\_\_\_ Push START button
- \_\_\_\_\_ Lower skip manually to loading level
- \_\_\_\_\_ Receive and interpret signal to hoist when skip is full
- \_\_\_\_\_ Set hoist switch on AUTOMATIC

Fill in the blanks with the letter of the answer that best completes each sentence.  
Read all of the choices before selecting your answer.

15. The hoist operator stops an automatically operated hoist by \_\_\_\_\_.

- a. closing the deadman switch
- b. releasing the clutch
- c. pushing the STOP button
- d. noting the depth indicator and rope speed meter
- e. a and b

16. The people in an automatic elevator select their destination level by \_\_\_\_\_.

- a. signaling the hoist operator
- b. pushing the correct button
- c. marking the depth indicator
- d. none of the above

## TEST QUESTIONS FOR EMERGENCY PROCEDURES

Fill in the blanks with the letter of the answer that best completes each sentence.

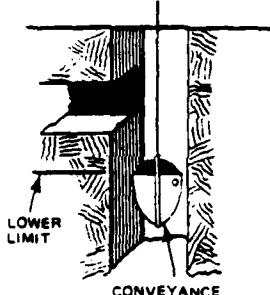
1. The hoist operator should know the emergency procedures for conditions \_\_\_\_\_.
  - a. in the mine that require evacuation
  - b. in the hoist area that prevent safe operation of the hoist
  - c. in the mine that may endanger personnel underground but don't require evacuation
  - d. all of the above
  - e. none of the above
2. If an emergency occurs in the hoist area, the hoist operator \_\_\_\_\_.
  - a. calls the mine superintendent
  - b. requests the necessary assistance
  - c. corrects the situation
  - d. waits for an inspection check then notifies the foreman
  - e. b or c
3. Emergencies that may occur in the hoist area may include \_\_\_\_\_.
  - a. loss of all power or power to individual units
  - b. mechanical defects in hoist rope, brakes or clutch
  - c. motor generator failure
  - d. electrical braking failure
  - e. all of the above

Below are the steps the hoist operator performs for different emergency procedures. Number the steps for each procedure in the order they are performed.

4. To restore lost power, the hoist operator will:
  - \_\_\_\_ Restart other machinery
  - \_\_\_\_ Set the brake
  - \_\_\_\_ Restore power
  - \_\_\_\_ Put the hoist control on OFF
  - \_\_\_\_ Make sure the other machinery is switched off

5. To return the conveyance to the operating area of the shaft after overtravel, the hoist operator will:

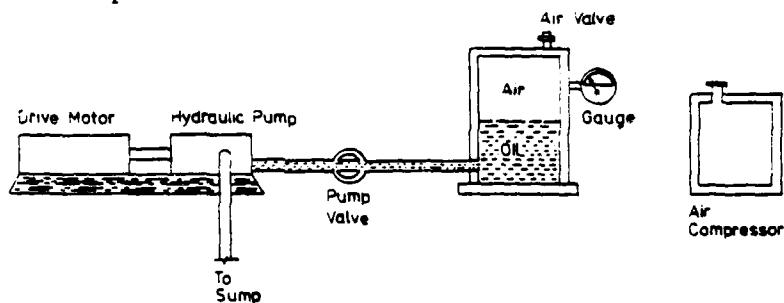
- Engage the overtravel bypass switch
- Disengage the overtravel bypass switch
- Use the controller to move the conveyances to within the operating area



6. To restore power to the hoist after the overspeed control cuts off power, the hoist operator will:

- Reset power ON switch
- Put the controller in OFF
- Set the brake

7. Below is an illustration of a hydraulic system. To restore or add air pressure to the system, the hoist operator will:



- Open the air valve and bleed air from the reservoir
- Connect the compressor to the air reservoir
- Restart the hydraulic pump
- Start the compressor and charge the air reservoir
- Stop the hydraulic pump and close the pump valve
- Stop the compressor when the pressure is back to normal and disconnect it

8. In many mines it is the hoist operator's responsibility to alert personnel about \_\_\_\_\_.
  - a. fire
  - b. ventilation failure
  - c. flooding
  - d. all of the above
  - e. none of the above
9. The hoist operator's responsibility during an emergency which requires evacuation is to operate the hoist until \_\_\_\_\_.
  - a. the first cage is unloaded
  - b. all personnel are clear of the endangered area
  - c. the cage is at the loading level
  - d. the ore and waste is unloaded
  - e. a and c
10. If the hoist station is underground, the hoist operator will need a respirator with an independent \_\_\_\_\_ to use during the evacuation period.

## TEST QUESTIONS FOR END OF SHIFT ACTIVITIES

Fill in the blanks with the letter of the answer that best completes each sentence.  
Read all of the choices before selecting your answer.

1. To put the hoist in a release state at the end of the shift, the hoist operator \_\_\_\_\_.
  - a. moves the conveyances to mid-shaft position
  - b. secures the conveyances
  - c. enters necessary information in the log
  - d. moves the conveyances clear of the landing level
  - e. all of the above
2. The hoist operator records \_\_\_\_\_ in the log at the end of the shift.
  - a. the foreman's activities
  - b. the hoist condition
  - c. problems encountered during the shift
  - d. b and c
  - e. none of the above
3. To secure the conveyances, the hoist operator does the following:  
\_\_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_\_. (Write in correct order).
  - a. sets the brake
  - b. sets the motor control on OFF
  - c. checks that conveyances balance
  - d. applies power slowly
  - e. turns the power switch off

**TEST QUESTIONS FOR HOISTING PROCEDURES**  
**FEDERAL REGULATIONS**

**Metal and Nonmetallic Mines**

Fill in the blanks with the letter of the answer that best completes each sentence or write the word that best completes each sentence.

**HOISTING PERSONNEL**

1. No person shall operate a hoist unless within the preceding \_\_\_\_\_ he has had a medical examination by a qualified, licensed physician who shall certify his fitness to perform this duty. Such certification shall be available at the mine.
  - a. week
  - b. month
  - c. 12 months
  - d. 3 years
  - e. none of the above
  
2. When a manually operated hoist is used, a qualified hoistman shall remain within hearing of the telephone or signal device \_\_\_\_\_.
  - a. only during the beginning of the shift
  - b. only when ore or waste is being hoisted
  - c. at all times while any person is underground
  - d. only at the end of the shift
  - e. none of the above
  
3. When automatic hoisting is used, a competent operator of the hoist shall be readily available at or near the hoisting device \_\_\_\_\_.
  - a. only during the beginning of the shift
  - b. while ore or waste is being hoisted
  - c. while any person is underground
  - d. only at the end of the shift
  - e. none of the above
  
4. Only \_\_\_\_\_ persons shall be in hoist rooms.

5. Only experienced hoistmen shall operate the hoist
  - a. except in cases of emergency
  - b. except at the end of the shift
  - c. except in the training of new hoistmen
  - d. except at the beginning of the shift
  - e. a and c
6. During shift changes a/an \_\_\_\_\_ person shall be in charge of each trip in which persons are hoisted.

#### RIDING IN THE CONVEYANCE

7. In shafts inclined over 45 degrees, the operator shall determine and post in the conveyance or at each shaft station the \_\_\_\_\_. Each person shall be provided a minimum of 1.5 square feet of floor space.
  - a. maximum number of persons permitted to ride in a hoisting conveyance at one time
  - b. minimum number of persons permitted to ride in a hoisting conveyance at one time
  - c. number of persons required for each job
  - d. a and c
  - e. none of the above
8. Men shall \_\_\_\_\_ conveyance in an orderly manner.
  - a. enter
  - b. ride
  - c. leave
  - d. all of the above
  - e. none of the above
9. Men shall not enter or leave conveyances \_\_\_\_\_.
  - a. when the safety gate is open
  - b. which are in motion
  - c. after a move-conveyance signal is given to hoistmen
  - d. b and c
  - e. none of the above
10. Cage doors or gates shall be \_\_\_\_\_ while men are being hoisted.
11. Cage doors shall not be opened until the cage has come to a \_\_\_\_\_.

12. Men shall not ride in \_\_\_\_\_.
- skips or buckets with materials
  - skips or buckets with muck
  - skips or buckets with supplies
  - skips or buckets with tools other than small hand tools
  - all of the above
13. Persons shall not ride the \_\_\_\_\_ of any shaft conveyances except when necessary for inspection and maintenance, and then only when suitable protection for persons is provided.
- crosshead
  - rim
  - bonnet
  - bail
  - all of the above

#### RAISING AND LOWERING MEN

14. Hoistmen shall use extreme \_\_\_\_\_ when hoisting or lowering men.
15. The \_\_\_\_\_ speed for hoisting men shall be determined for each shaft and this speed shall not be \_\_\_\_\_.
16. Men shall not be hoisted at a speed faster than \_\_\_\_\_ except in an emergency.
- 1,000 feet per minute
  - 2,500 feet per minute
  - 2,500 feet per hour
  - 2,500 feet per second
  - none of the above
17. When men are hoisted in buckets, speeds shall not exceed 500 feet per minute and shall not exceed 200 feet per minute when within \_\_\_\_\_ of the intended station.
- 10 feet
  - 800 feet
  - 300 feet
  - 100 feet
  - none of the above

18. Maximum normal operating acceleration and deceleration shall \_\_\_\_\_.
  - a. exceed 6 feet per second
  - b. not exceed 6 feet per second per second
  - c. not exceed 1 foot per second per second
  - d. be 50 feet per second
  - e. none of the above
19. Conveyances shall not be lowered by the brakes alone except during \_\_\_\_\_.
20. When combinations of cages and skips are used in the same compartment \_\_\_\_\_.
  - a. muck can be hoisted with personnel during shift changes
  - b. the cages shall be enclosed
  - c. the hoist speed shall be reduced to manspeed not to exceed 1,000 feet per minute
  - d. muck shall not be hoisted with personnel during shift changes
  - e. b, c, d
21. During shift changes, rock or supplies shall not be hoisted in the same shaft as men and supplies during shift changes \_\_\_\_\_.
  - a. except at the beginning of the shift
  - b. unless the deadman switch is broken
  - c. unless compartments and bins are partitioned to prevent spillage
  - d. unless bins can spill into the cage
  - e. none of the above
22. Open hooks shall not be used to hoist \_\_\_\_\_.
  - a. cages
  - b. buckets
  - c. skips
  - d. all of the above
  - e. b and c
23. Buckets shall be stopped about 15 feet from the \_\_\_\_\_ to await a signal from one of the crew on the bottom for further lowering.
  - a. collar
  - b. first landing
  - c. dump area
  - d. shaft bottom
  - e. none of the above

24. All buckets shall be stopped after being raised about three (3) feet above the shaft bottom and \_\_\_\_\_.  
a. the bucket will be stabilized before a continue hoisting signal is given  
b. hoisting to the crosshead will be at minimum speed  
c. the signaling device will be attended constantly until the bucket reaches the guides  
d. when persons are hoisted, signaling devices are attended until crosshead is engaged  
e. all of the above
25. Where mine cars are hoisted by cage or skip, means for blocking cars shall be provided \_\_\_\_\_.  
a. at all landings  
b. on the cage  
c. for at least one point in the shaft  
d. a and b  
e. none of the above
26. When tools, timbers, or other materials are being lowered or raised in a shaft by means of a bucket, skip or cage, they shall be secured or so placed that \_\_\_\_\_.  
a. they won't strike the sides of the shaft  
b. they will strike the sides of the shaft  
c. they can move about freely  
d. they can slide easily from side to side  
e. none of the above

#### PLACING THE CONVEYANCE IN RELEASE STATE

27. When conveyances controlled by a hoist operator are not in use, they shall be released and the conveyances shall be raised or lowered a suitable distance \_\_\_\_\_.  
a. to allow persons to board or load the conveyance  
b. to allow persons to get on the top of the conveyance  
c. to prevent persons from boarding or loading the conveyance  
d. a and b  
e. none of the above

#### Underground Coal Mines

28. Where persons are transported into or out of a coal mine by hoists, a qualified hoisting engineer shall be on duty while any \_\_\_\_\_ is underground.

29. A hoisting engineer is not necessary for automatically operated \_\_\_\_\_.

- a. elevators
- b. cages
- c. platforms
- d. all of the above
- e. none of the above

30. An attendant shall be on duty at the surface when men are being hoisted or lowered \_\_\_\_\_.

- a. until the beginning of each operating shift
- b. at the beginning of each operating shift
- c. at the end of each operating shift
- d. a and b
- e. b and c